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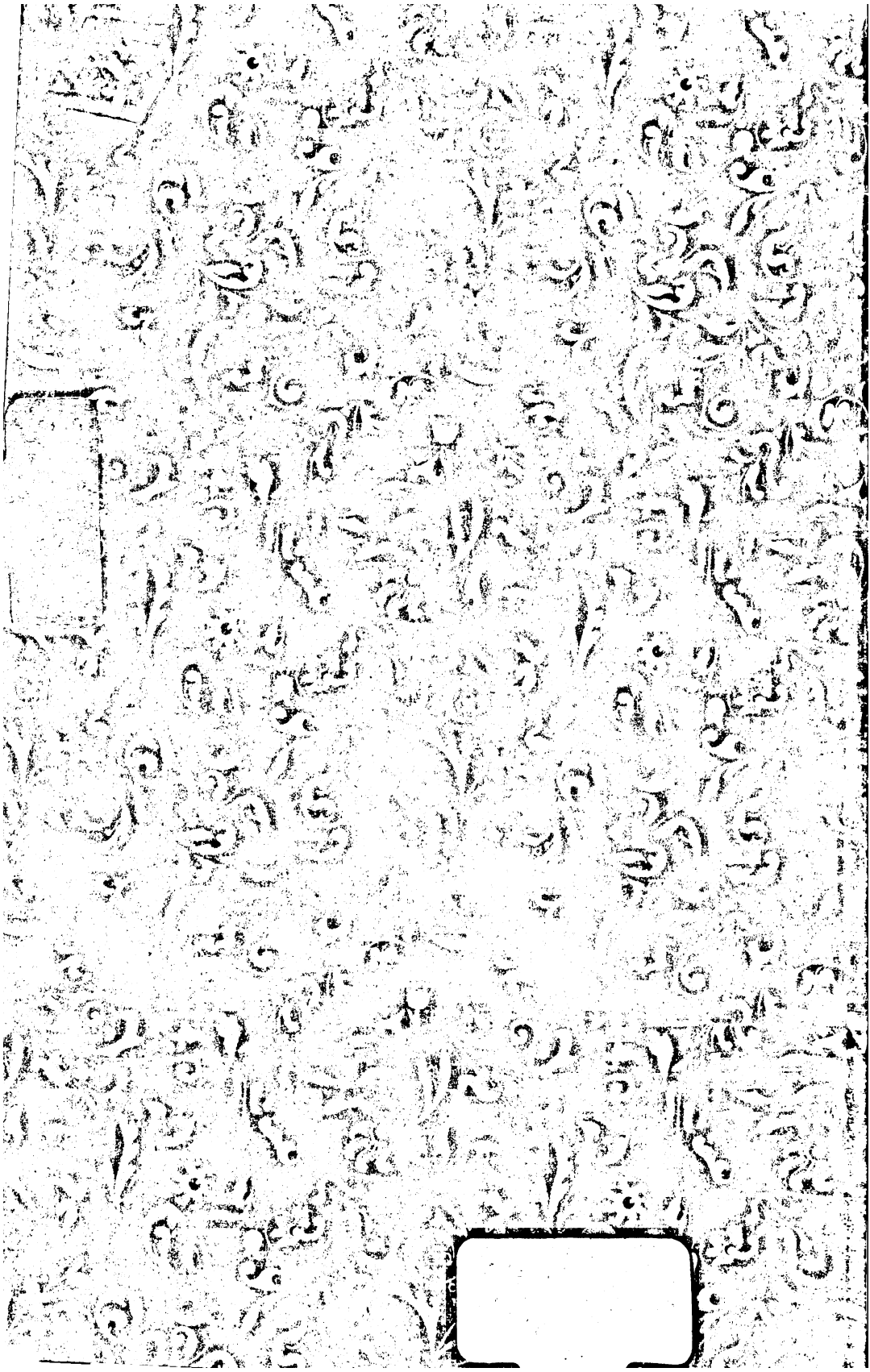

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TRANSACTIONS

OF THE

National Dental Association

AT THE

SEVENTH ANNUAL SESSION

HELD AT

ASHEVILLE, N. C.

July 28-31, 1903.

DENTAL DIGEST.
J. N. CROUSE, D. D. S., PUBLISHER,
D. H. CROUSE, EDITOR.
CHICAGO.
1904.

BOST
MAR 23 1909
NOV 14
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ANNUAL ADDRESS.

By L. G. NOEL, President.

Six years have elapsed since our National Dental Association was organized by the union of the American and Southern Dental Associations. Let us see if we have been faithful to our trust in the meantime. Have we been energetic, enthusiastic, and prolific? We have produced some most excellent scientific and literary work that cannot be summed up and set before you for your admiration and satisfaction, because such work is educational, and therefore invaluable on account of its far-reaching influence, but should we not have accomplished much more?

Our Membership.—If the benefits we derive from our membership and attendance upon the meetings of this Association can be made apparent to our fellow practitioners they will lose no time in joining us. Our difficulty here lies in our inability to make tangible our mental acquisitions. It follows then as a necessary conclusion that we must add to these invisible benefits something more apparent and better calculated to fix the attention of the rank and file of the fraternity. It may be urged by some that we will do better with an exclusive organization composed of the flower of our profession. This opinion, I am sure, must give way before a thoughtful examination of the subject, for while our doors are well guarded against the unethical and vicious, our mission clearly is to elevate and instruct the humble and deserving who feel the need of our teaching.

As the best indication of our condition is our growth, it may be well to briefly review the progress made during the last few years.

When the American and the Southern Dental Associations were united in 1897 we started out with an organization numbering three hundred and sixteen active members and twelve honorary members. Our second meeting at Niagara Falls in 1899 showed an enrollment of three hundred and seventy-four, an increase of forty-six. At the third meeting at Old Point Comfort we produced a list of three hundred and eighty-six, an increase of twelve. At the fourth meeting in Milwaukee we had a list of three hundred and fifty-five, a falling off of thirty-one. At the fifth meeting at Niagara Falls last year we had three hundred and sixty-four, having gained nine over the previous year. The above figures are from the Treasurer's report, which gives only the names of those present at the meetings and of the absentees who send in their dues. The list of members as I obtain it from the publishers of our transactions gives a total of four hundred and twenty at this time.

A letter addressed to the publishers of Polk's Directory, asking the number of dentists in the United States, elicited the following: "Your esteemed favor of 23rd inst. is received and we regret that we are not in possession of the statistics desired by you. We have, however, gone over the Register and computed the number of dentists in the United States, which makes 28,481 according to the last directory. We enclose the slips made out by our clerk which will give you the number in each state. We would not feel safe in estimating the number who are registered and who are legalized practitioners. In all cases where we were able to procure the information the directory shows who are registered, but in many instances this information was not obtainable."

Allowing for the large number of advertising men and those who by unethical methods put themselves outside the ranks of the regular profession, we estimate the number available for membership in this Association at ten thousand at the least. When we contemplate our present enrollment of only four hundred and twenty members it will be admitted that these figures do not show as rapid growth as we had reason to anticipate, and it will be well for us to endeavor to find out the obstacles in the way of our increase. I have put this question to many of our thoughtful and zealous members during the past year, and numerous reasons have been assigned, some of which

I shall set before you, begging that you give the subject a searching examination to the end that we may remove these hindrances and henceforth show a development equal to that of other similar scientific organizations in America.

Love for Our Association.—The first and the greatest cause for our humiliation is a lack of love for our National Dental Association. If we had the same love for it and the same pride in it that we feel for our everyday work, how different our meetings would be. How much more gratifying to contemplate the result of each year's transactions. If we were inspired by such a love for our Association we would glory in making sacrifices for it. We should need no price to purchase our devotion, but would pursue our work with ardor because of our pride in the honor our achievements would bring to our profession. On the contrary, are we not often actuated by small personal ambitions rather than these nobler sentiments, and do we not frequently fritter away valuable time in our meetings in the promotion of petty political schemes? Have these not engendered frictions resulting in enmities between our members, causing some to absent themselves who should be with us to-day doing valiant service for our common cause?

We must leave these petty motives behind if we would see this organization grow and prosper. Let us come to our annual meetings with clean hearts, warm with fraternal love. Let us bury forever all enmities and jealousies, that we may labor as one man for the benefit of suffering humanity. We must throw ourselves into our work with all of our united energies, with singleness of purpose, forgetting our small, selfish interests in an earnest desire to elevate our calling and make it glorious before the world. Let us carry these sentiments into the work for our state societies as well as for this Association, resolved that in making them do for themselves we shall make them build up the parent body.

Time of Meeting.—Many with whom I have talked think the time we have chosen for holding our annual meetings is unfortunate, and urge that quite a number wish to avail themselves of the vacation season to go abroad. Others wish to go with their families and friends to seashore and mountain resorts. The busy practitioner feels the need of rest during the heated term, yet we come to our meetings for work. On the other hand, winter is the best time for scientific study and such work as we do at our meetings—the season

when the brain is most active, and when on account of the rough weather and short days we can do but little practice, hence can better spare the time for our meetings. The objection that a number of our most prominent members are engaged in teaching in dental colleges and cannot leave their work during the term does not seem to be sustained by the facts, for at some special meetings held in February, and notably at our southern branch meetings in that month, the attendance of college men has been large. I would therefore recommend that we try the month of February for the meeting of 1905.

Revision of the Constitution and By-Laws, and Our Relation to State Societies.—In his address at our fourth meeting in Milwaukee the president, Dr. Black, called our attention to some defects in the constitution and by-laws, suggesting several amendments. In this address he pointed out clearly the reasons for these changes and the good to be effected by their adoption. Having compared Dr. Black's proposed new constitution with the original, and having studied these in the light of his address, I find much to commend in the new constitution, and therefore recommend that the committee having this matter in charge be instructed to go over Dr. Black's work and get ready to present the new constitution for adoption as early as possible.

The original intent in providing for delegate members was to build up our Association out of the material sent us by the state societies as delegates. This method had long been in use and was found efficient in the two bodies that united to form this Association, and it can be seen by examining their records that in most instances delegates from state and local societies allied themselves with the parent body as permanent members. The idea in making representation by delegates from smaller organizations a feature was to produce a reciprocal benefit between those societies and the National. It was expected to result in the formation of new state and local societies and to compel a recognition by all these of the National body. It was intended that annual reports of the membership and work of the state societies should be made at the National meetings, and that the parent body should assume a fostering care of the state societies, making membership therein much to be desired. It appears that these beneficent results have not been reached because representation has not been sought by these lesser organizations.

Our delegate membership has grown smaller from year to year until at the last meeting we had but four. We have a standing committee whose duty it is to "arouse interest in and secure the cooperation of the various state and local societies in the work of the National Dental Association." I hope that this committee has been diligent in its work and that we shall see the fruits of its labors this year. Each state society should be requested to appoint a committee to cooperate with said committee.

In Dr. Black's address he stated that in 1895 the American Dental Association, composed of two hundred and fifty-five permanent members, had fifty-three organizations represented by delegates. We seem to have departed somewhat from the representative features of former days. Dr. Black has introduced into his new constitution a section in the article on membership to correct this evil. All state societies should be requested to publish in their programs the time and place of the meeting of the National Association, and the secretaries should be required at the close of the state meetings to forward to the secretary of the National a list of the delegates elected to represent them. The constitutions and by-laws of all the state societies should be so amended as to enable the presidents to appoint delegates. Delegates should be appointed by the president and not elected by ballot, the reason for which is obvious. Often the state meeting is over when the would-be delegate makes up his mind to attend the National. For each delegate an alternate should be appointed, and while permanent members of the National should not be chosen as delegates, they may be made alternates.

The amendment requiring the corresponding secretary to make an annual report, showing the condition, membership and work of the state societies, is one of the best means of preserving the mutual interest between the state organization and the parent body, and should be adopted. In prosecuting the study of methods for increasing our membership and keeping up enthusiasm in our work this idea of preserving the interest of the state societies in the National body and of making them show their allegiance thereto has constantly gained force and has been repeatedly suggested by those with whom I have consulted. I therefore ask the committee on constitution to study the question thoroughly and shape our constitution to this end.

The suggestion has been offered that provision should be made

in our constitution to enable state societies to tender membership in the National to any one obligating himself to subscribe to its constitution and by-laws and pay a certain sum, a portion of which is to be forwarded to the treasurer of the National.

I would also recommend for your favorable consideration the method proposed in the new constitution of dividing the work into sections, and the retention of the chairmen of the sections for two years after presiding over a section, to overlook and assist in the conduct of the work. The idea of forming a program committee of these chairmen, who are to be well distributed over the country, three from each section, is especially well conceived and should be adopted. The need of a program committee is obvious. The present method of putting upon the president and secretary the final work of making up the annual program is very defective, and I am sure all those who have labored to make up the program and have felt the burden of this responsibility will heartily approve and welcome the change.

Branches.—If we would see our society grow into a large, vigorous, and healthy organization of several thousand active members we must enlist the hearty interest of every portion of the country. At present there are large sections of the United States where little is known of the National Dental Association and its work. This is especially true of the west, as the distance is so great that very few can undertake to make the annual journey from the Pacific States to places east of the Mississippi River, and men cannot spare so much time from their work. Under our present constitution and the manner in which we have arranged to rotate our meetings, two-thirds of them must necessarily be held east of the Mississippi, compelling our western members to make these long journeys if they would take a part with us. Some of the best men in the profession reside in the west, and we need and should enlist their interest. We should do this by organizing a branch in the west according to the plan proposed at the time the union was effected.

I believe that a branch in the east would be a good thing, but I am told that a meeting was called somewhere in that section for the purpose of organizing a branch, and after some discussion it was decided to dismiss the subject for the time, as most of those present thought the east had already too many societies. If this is the prevailing opinion in the east I would not insist upon a branch for that

section, but the west needs it worse than the south ever did, and we need the west with its rapidly increasing population, its energy and brains. The founding of a branch in this section is clearly the best method of getting in touch with its remote regions, and I therefore recommend the appointment of a committee at this meeting to carry out that object.

The Need of Conducting Our Own Publications.—In discussing available means of improvement, another method that is constantly brought up is the publication of a monthly journal that shall be essentially the organ of our society. In a monthly of this character the papers and discussions, reports of clinics, and general transactions would reach us much sooner than by the present method of waiting for the annual volume of transactions, but it need not depend alone upon this source of supply, for many would be stimulated to write articles for our journal in the interim between sessions. The journal could also give us the news of the day in our profession, reports of papers and discussions from other societies, professional items from foreign countries, in short, any matter that would be of interest to the dental reader. For examples of the successful conduct of monthly journals by organizations like ours, I point you to the British Dental Association and to the American Medical Association. The old objection that we cannot raise the necessary funds as long as our membership is so small will yield before a little determination and strenuous effort. Let us first appoint committees in each state to solicit subscriptions, and as soon as we get one thousand paid subscriptions the publication may commence. I believe this easily possible if the idea meets with your hearty and unanimous approval, and with one thousand subscribers we should easily get advertisements enough to make the journal a success. In a short time we may be able to offer our journal with the volume of transactions to all of our permanent members for the annual membership fee, which would be found a strong inducement for new members. If we go into this enterprise we should have for its management men who have had experience in such work, and our journal should be superior to all others. It should be edited by a man of ability, thoroughly experienced in such work, and issued from the press of publishers well equipped to produce the best results. Every member of our Association should feel obligated to give the enterprise his most earnest and unqualified support, even to the extent of stand-

ing assessments for its maintenance if necessary until the enterprise shall have become self-sustaining. With the same equipment we could print our volume of transactions, avoiding the delays that have been complained of in the past.

The International Dental Congress.—The idea of holding an International Dental Congress at St. Louis in connection with the Louisiana Purchase Exposition had its origin in the minds of some of our members from Missouri, who put it before the state and local societies and the officers of the Exposition, and as the scheme grew in strength it was decided to put it in charge of the National Dental Association to carry through. Accordingly it was decided at the last session to extend an invitation to the Federation Dentaire Internationale, then soon to convene in Stockholm, to unite with us in holding a congress at St. Louis in 1904. A resolution was offered to this effect and delegates were sent to the meeting at Stockholm to convey the invitation. Your president, Dr. Libby, in accordance with your wishes and the expressed desires of our delegates to the Federation Dentaire Internationale, appointed a committee of fifteen to organize the congress. Your invitation was accepted and the Federation appointed a committee of nine to collaborate with your committee.

There arose some most unfortunate misunderstandings between these two committees that resulted in very regrettable delays and frictions, but it is to be hoped that all this is over and that the work will be pushed forward with energy, all resolved to cooperate harmoniously to make this the largest and most enthusiastic gathering of dental surgeons the world has ever seen. We must go into this work resolved to make the scientific and literary features of the congress a success, and determined to let nothing mar the dignity of our proceedings.

Your committee of organization extended also an invitation to the British Dental Association, at its recent meeting at Brighton, England, which invitation was conveyed to them by our duly appointed delegate, Dr. M. H. Cryer, and I am happy to report that it was accepted, and that we are to have as our guests at the congress the representatives of that large and important scientific body. I would recommend that you extend similar invitations to all important national dental societies throughout the world, that we make this truly an international dental congress in the fullest sense.

Provision for Our Aged and Invalid Members.—So many instances of aged and invalid dentists seeking assistance from professional confreres have presented themselves to my notice that I have long entertained the thought that it would be a good thing to raise a fund in our Association to be used for their maintenance. I have talked with a few of our members and all seemed to think well of it, but no one has offered a practical suggestion as to the ways and means for raising the money. If we could increase our membership to several thousand we might in the course of time accumulate a surplus fund, as the American Medical Association has done. It is said that it has a surplus of sixty thousand dollars in the treasury.

Do we need to wait so long for the accomplishment of an object so desirable and so benevolent? I think a fund for this purpose could be started by subscription. When the profession wanted money to fight frauds it was promptly raised by subscription, and nobody who gave to the cause ever missed the contribution. If I could succeed in enlisting your interest in this cause you would raise twenty thousand dollars before this meeting adjourns. I would suggest that a committee be appointed to solicit subscriptions for this fund, and that the chairman of this committee be the treasurer, and be required to give a bond for safety of the fund. This committee should be ever active and diligent in soliciting funds for this object. Each state society should be encouraged to appoint a committee to prosecute the work, and the funds raised in the state societies should be paid annually (or oftener) into the hands of the treasurer of the parent committee.

It should be the policy to invest this money in safe and reliable securities, and use only the interest in alleviating the wants of those aged members applying for our charity. The distribution of this fund should be safeguarded by the most careful and rigid examination into the circumstances, habits, and surroundings of the applicants, that aid may be always judiciously and worthily bestowed. As to the manner of investment for safety combined with a good return in interest, we could profit by the examples set by some of our large insurance companies. The thought has occurred to me that the money could be more quickly raised for this purpose by adding a life insurance feature, as in some of the benevolent societies. If you can offer a small life insurance policy with member-

ship in the Association, it will build up your society rapidly. If there is anything in this idea I trust you will give it life and form after discussing it.

Another thought has been that something might be added to this fund by legacies coming to us from the opulent whose generosity may be aroused by benefits conferred during life by our profession, or from members who die without heirs to inherit their accumulated wealth. Much can be done by constant effort on the part of our members to keep the thought in the minds of the rich and benevolent. If we could see our old and invalid members drawing each a little annual pension from a fund like this, without diminishing the source of supply, and the families of our deceased members receiving a sum of money at the demise of each member, we should indeed feel that we had placed before the world visible evidences of the good to be derived from membership in the National Dental Association.

Recognition of the D. D. S. Degree.—At the last meeting of the American Medical Association the following resolution was passed: "Dentists who hold the degree of D. D. S. from a reputable dental college, and who are members of a recognized local or state dental society, may be admitted as dental members on recommendation of the officers of the Section on Stomatology and approval by a majority vote of the Section, the names of such members to be sent to the secretary by the secretary of the Section. * * * Dental members shall enjoy the same privileges as regular members and be subject to the same conditions." For several decades the attitude of the medical world toward the specialty of dentistry has been growing more deferential, and we have had from time to time marked evidences of approval, such as the founding of schools of dentistry in our great universities, the establishment of departments for teaching oral surgery in schools of medicine, and the opening of the Section on Stomatology in the American Medical Association. When the Section was first organized only those holding the M. D. degree could become members. This act admitting dentists to full fellowship in the above-mentioned body is the final recognition for which the specialty of dentistry has been waiting for more than sixty years. I therefore recommend that a committee be appointed to make formal recognition of this action.

If the opening words of my address were not altogether flattering and commendatory of the things we have done, if it is apparent

that we would have done better had we put forth our best efforts, there yet remains much cause for congratulation and hope for the future. Not the least of these is this recognition from the medical profession of our worthiness to affiliate with them. One deep-rooted conviction I wish to lodge in your minds as a closing thought—as our progress in the past has been due to our close relationship to the profession of medicine, to the aid, the instruction and encouragement we have drawn from that great source, so will our future be. Then let us draw nearer and foster and encourage a closer relationship as our brightest hope for the coming years.

SECTION III.

Operative Dentistry, Materia Medica and Therapeutics.

Cavity Formation for Inlay Fillings.

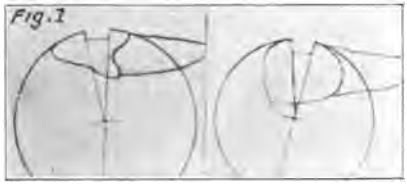
PAPER BY C. N. THOMPSON, OF THE SECTION.

In presenting this subject for your consideration there is no claim to originality, but simply a few principles made use of daily.

The interest manifested in cavity formation for porcelain fillings at the present time is probably due to a recognition of the fact that because of the difference between metal and porcelain our present knowledge of cavity and margin formation for gold cannot apply.

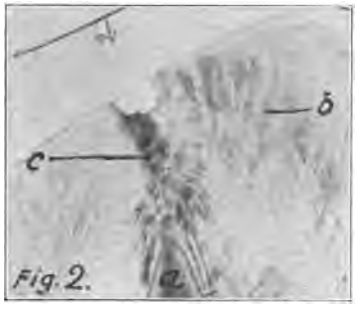
If our porcelains compared favorably with gold as regards edge strength there would be no question as to their utility, as advocated by the most enthusiastic, nor would there be need for special margin preparations for them, but owing to their edge frailties we are obliged to specialize in their favor. Porcelain is no stronger than tooth enamel, as is best illustrated by our present enamel margin preparation in occluding cavities for it, where to leave sharp-cornered cavity walls standing exposed to stress is considered the wisest procedure. Similar enamel formation for any other permanent filling would not be deemed practical, owing to its liability to chip, and if beveled margins are necessary to withstand stress, then teeth filled with porcelain must be as unreliable as beveled margins are desirable. This being true, we are forced in occluding cavities to choose between two evils, and so shape the exposed margin that both it and the filling at that point will have the strongest presentation, regardless of the lines of enamel cleavage, and rely on the cement for support where the dentin is gone.

Fillings of this material seldom break or crush. Failures are nearly always traceable to marginal weakness, due in part to the instability of the cement; therefore this is the vulnerable point. It is claimed that perfectly supported margins will not chip, which is perhaps true as long as the cement remains, but its permanency depends upon whether the margin in question is exposed to masticating wear. If not the cement disintegrates a little at first, but thereafter does not. If exposed, as it would be on the occluding surfaces



of posterior teeth, it not only disintegrates, but wears out also, after which chipping of the margins always does occur, which presents new opportunities for further wear on the cement, and so on to failure.

Drawing conclusions from the foregoing, it would seem as though



the only safe cavities in which to place porcelain are those not exposed to occlusal strains. This in the main is true, but owing to its great resistance to thermal change, combined with its esthetic effect, it may be used in cavities in posterior teeth within the lines of vision, provided that the margins are so located that the stress of mastication does not reach them.

Conservative practice should not sanction the insertion of porcelain on occluding surfaces of posterior teeth without the lines of vision

when it is possible to substitute gold inlays. They possess every good quality claimed for porcelain except appearance, and have the additional advantage of being practically indestructible, an absolute fit to the cavity, and of far greater protection to the cavity margins. Therefore preparation for porcelain in occluding cavities in posterior teeth is considered only because we are obliged at times to use it for its *esthetic effect.*

Notwithstanding its frailties, porcelain is at present the ideal filling for the anterior teeth. Patrons are as a rule willing to accept the risk of failure for the sake of having their teeth restored to normal

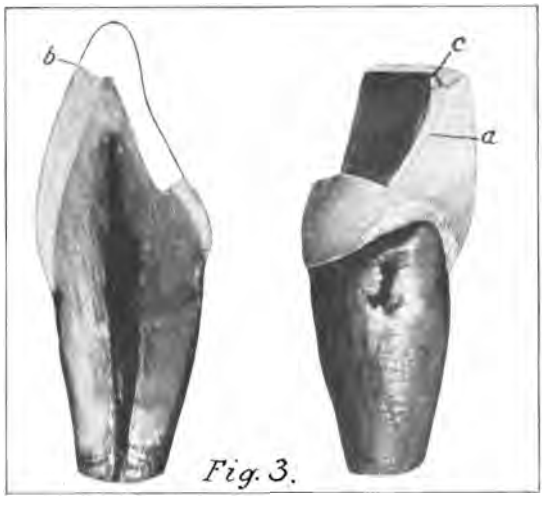


Fig. 3.

form and color, to say nothing of the ease of insertion and subsequent comfort.

Cavities for both porcelain and gold inlays must conform to principles common to all inlaid work, which are:

First. The cavity must be at least slightly smaller at the bottom or deep parts than at the orifice, and free from undercuts.

Second. The more nearly parallel the side walls are to each other the more secure will be the filling.

Third. Deep cavities afford the best anchorage.

Fourth. The more perfectly the filling is fitted, and the less cement necessary, the stronger the union.

The strongest possible form that can be given porcelain against chipping is spherical. Frailty begins and increases as we depart

from it. The next strongest general form is cubical, presenting right-angled corners. This is the general principle to be applied to the formation of the outer or exposed border of porcelain fillings.

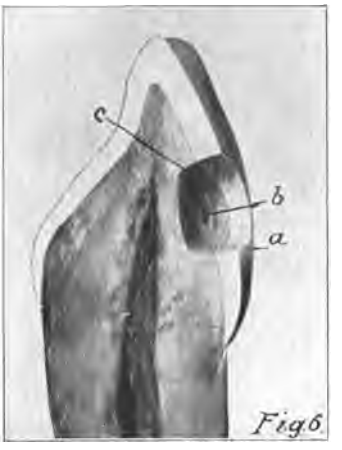
Close adherence to this principle is necessary to avoid chipping of the filling margins, and happily nearly all cavities in which porcelain

is desired are on convex surfaces, as labial, buccal or proximal. Also, as all convex surfaces are but segments of a sphere, it will be seen by consulting Fig. 1 that it is possible to form margins at right angles of the surfaces of the teeth, through which the lines of the side walls pass, conforming to first principle for inlaid work. This principle applies to all convex surfaces.

Fortunately, owing to the direction of the enamel rods in incisors, cavo-surface angles on occlusal enamel margins (d, Fig. 12) are strongest when prepared to follow the lines of cleavage, thus giving right-angle margin preparation to the filling.

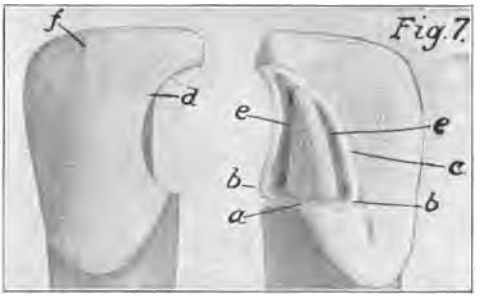
An examination of the enamel in the architecture of the tooth crown shows the rods diverging on axial surfaces and converging

on coronal. This plan gives cavities with two distinctly different arrangements of the enamel rods: First, where the rods incline away from the cavity, as seen in labial, buccal and proximal cavities; second, where they incline toward the cavity, as seen near lingual



pits in incisors and cuspids, and in strictly occlusal cavities in bicuspids and molars.

The object in calling attention to this is to show that it is impossible to prepare extensive cavities with nearly parallel side walls on



axial surfaces, without in some places cutting away the inner ends of the enamel rods, leaving those on the very margin unsupported. This, however, in cavities so located is considered good practice, for it is thought better to disregard enamel cleavage, and devote entire attention to securing a properly formed filling. In connection with

this it might be well to call attention to the natural strength of enamel margins near the fissures in bicuspids and molars where, because the enamel rods lean toward the cavity, the margin becomes much stronger than porcelain and can be formed to suit the needs of the filling. I also desire to speak of the arrangement of the enamel rods at or near the summit of cusps (Fig. 2), where the surface area of the enamel so far exceeds the dentin support that many of the rods do not rest on the dentin at all. This produces a broken arrangement of long, short and uneven rods, which is not strong and invites disaster unless beveled. Nevertheless, because tooth enamel

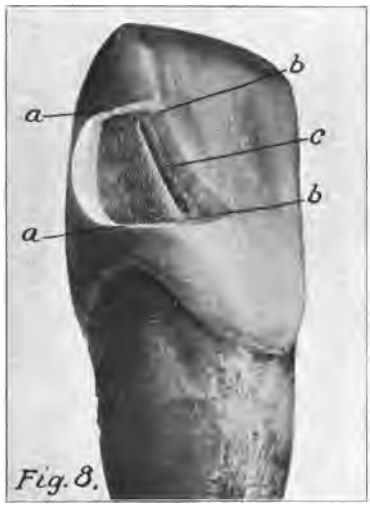


Fig. 8.

and porcelain are of about equal edge strength, we are compelled to disregard the lines of cleavage in all cavities, because to follow them would often produce fillings with acute-angle outer margins, which must be avoided at all hazards, for even the pressure necessary to force the filling home into the cement-lined cavity is sufficient to cause chipping if the margins are acute.

The foregoing does not in any way alter the general principle that enamel is safest when all of the rods are supported by dentin. The term sharp, as applied to enamel, means that as a continuation of the cavity side walls it shall be finished to a clear, clean edge, as shown at a, Fig. 3. The pitch of the enamel in any given cavity is

determined mostly by the needs of the filling, that it may be given nearly right-angled margin formation, as shown at b, Fig. 3.

In occlusal molars and bicuspids, so long as the cavity remains on the central slope with the enamel rods leaning toward it, the tooth margin will take care of itself, but when the margins enter or even approach the zone of perpendicular rods, near the summit of the cusp, risk begins, because of their usually imperfect arrangement at that point, even though well supported by dentin.

Therefore, whenever the extent of occluding cavities requires that the margins be so far from the fissure as to enter the zone of doubtful cusp enamel, it should be cut out on to the axial surfaces, far

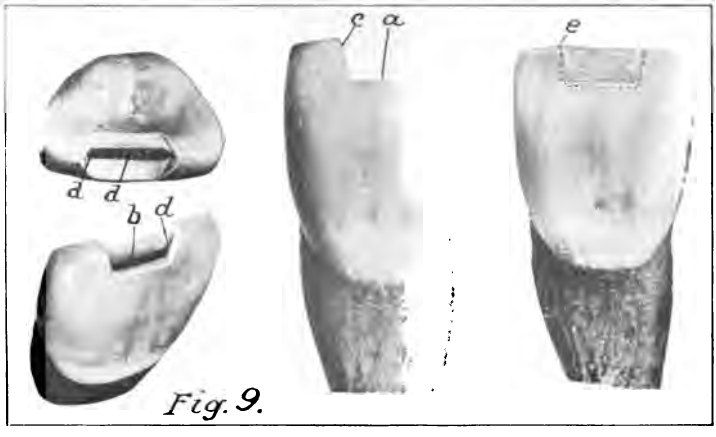


Fig. 9.

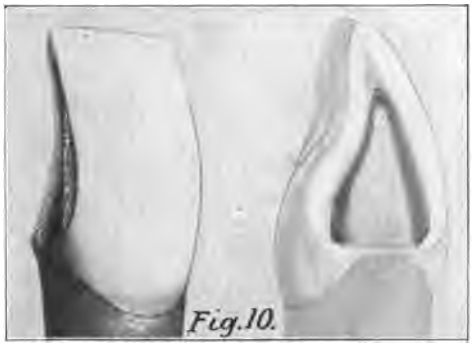
enough to remove the margin from masticating wear, and give bulk of porcelain under it sufficient to stand. (Fig. 4.)

Owing to the fact that porcelain fillings are so toothlike in appearance and neighborliness, there is no need to hesitate about cutting extensively for sound tissues for margin, nor to fear deep cavities that come into close proximity with the dental pulp; neither is symmetrical cavity outline necessary, in fact, the more crooked or zigzag the margin the less conspicuous the filling.

The question of the practicability of retention grooves in cavities prepared for porcelain is yet unsettled, probably because the subject is still new. Arguments either way at the present time are futile, because of the multitude of possible inaccuracies connected with the various and intricate steps in the process of making and inserting

fillings of this material. As a mechanical problem, however, all other things being equal, the larger the cement area in proportion to the size of the filling the greater the security, and the greater number of grooves there are in any given cavity the larger the area for cement attachment, which alone is sufficient reason for their adoption, to say nothing of the possibilities of interlocking arrangement of the grooves and prominences.

Simple cavities (Figs. 5 and 6) are those found on the labial, buccal, lingual and some proximal surfaces, and differ from the usual preparation for gold only in that the walls of the cavity must be perpendicular to the respective surfaces of the tooth, which the



lines of the walls intersect, thus leaving sharp enamel margins to the edge of the cavity and obliterating undercuts. (a, Fig. 6.)

Secure depth to insure against breaking the filling while under the pressure which should accompany setting, also to give room at the bottom of the filling for dentin-colored foundation bodies, which are necessary to prevent the cement from reflecting through. It also adds to the security of anchorage.

The pulpal wall or floor should be so prepared as to give the filling a uniform thickness and a triangular arrangement of grooves, except that if the cavity be small and circular it should be in at least one convenient place slightly but abruptly deepened, pit-like (b, Fig. 6), to act as an anchorage to the matrix during burnishing, and to furnish the under side of the filling with a bead-like projection to guide it accurately to its seat. The union of side and floor (c, Fig. 6) should be an easy curve, avoiding an angle, thus facilitating the escape of cement, which has a tendency to pack between flat surfaces.

The preparation of proximal cavities differs but little from the simple, unless they are large enough to menace the incisal edge, or to involve extensively either or both enamel walls. Those which approach near to the incisal edge, leaving a frail corner of enamel unsupported by dentin (Fig. 7), are worthy of much consideration, for in order to avoid exposing the margins of the filling to incisal wear it is considered advisable to retain the incisal edge intact even to frailty, depending upon the support offered by the cemented filling for reinforcement. Experience has demonstrated that sound incisor corners, even though extensively undermined and without supporting dentin, give more lasting results than when cut away, for the reason

that the cement is not exposed to wear on the proximal surface, and fractures do not occur unless the support gives way.

This presents a cavity with both labial and lingual plates of enamel affected, and it is usually of sufficient depth to offer good anchorage, but more security to the filling is offered if the lingual opening is largest, which formation gives the filling a wedge-like shape, with the base exposed to the lingual strains, which tends to greater security.

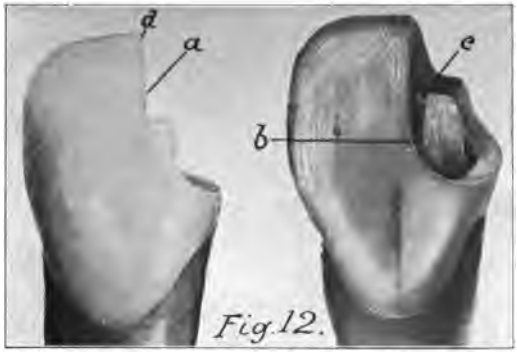
DETAILS OF CAVITY FORMATION. (FIG. 7.)

Gingival Wall. This wall should not be extended rootwise, to carry the filling margin under the gum, because the cement lasts better when not covered by the tissues. It should be prepared as a

horizontal plane, made flat mesio-distally, with a slight incline rootwise as it approaches the axial wall, when it is finished sharp. (a, Fig. 7.) It should be extended labio-lingually to a union with the labial and lingual walls, whose position is governed in a modified way by the needs of the case, as regards extension for prevention. (bb, Fig. 7.)

Lingual Wall. All possible enamel should be saved to reduce the amount of cemented margins to be exposed to lower incisor wear. If extensively broken, however, it should be cut back to sound tissue, as in c, Fig. 7, and rounded into union with the gingival and incisal margins.

Labial Wall. There is no necessity to cut this wall back further than sound enamel, but because it is possible to restore absolutely it



can be cut to any extent or shape. It should be sacrificed if necessary rather than the lingual. Its general form is outlined in d, Fig. 7.

Pulpal Wall. The shape of this is governed by the other walls, but should be formed with a view to give security to the filling, being slightly grooved in the dentin, just inside the labial and lingual enamel, as in ee, Fig. 7.

When the labial wall is not involved, extend the lingual opening quite extensively (Fig. 8), cutting the incisal and gingival cavity walls at right angles to the proximal surface (aa, Fig. 8), rounding them into union with the lingual margin, which is cut parallel to the axis (bb, Fig. 8), having groove cut in dentin parallel and near the lingual enamel margin. (c, Fig. 8.) This gives a self-locking, wedge-shaped filling, with good bulk of porcelain to withstand the strains that occur on lingual surfaces. Proximal cavities, with either

the labial or lingual plate of enamel intact, are practically simple cavities unless very large, but their preparation is embodied in what has been said regarding cavities with both walls involved.

Incisal Cavities. In consequence of their usually diminutive size and exposed position incisal cavities are difficult to manage and to obtain good retention for the filling. The best procedure is to deepen the cavity until the dentin is reached, preparing the floor on a horizontal plane (a, Fig. 9), cutting a definite groove in the dentin between the plates of enamel. (b, Fig. 9.) It is necessary that the side walls should be as nearly parallel to the axis and to each other as inlay work will allow (c, Fig. 9), and grooved at d definitely in the middle from near the incisal edge down to a union with the

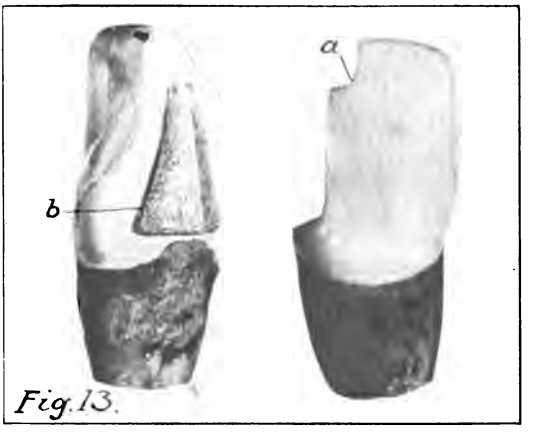


Fig. 13.

groove d in the floor. The union of the side walls and floor should be nearly right-angled, leaving the entire floor flat, to offset tilting strains. The terminus of the side walls at the incisal edge should be finished on the lines of cleavage and sharp.

Proximo-Occlusal Cavities in Incisors and Cuspids. The general outline of the proximo-incisal cavity should be right-angled, with the cervical floor as the base and the pulpal wall as the perpendicular. (Fig. 10.)

Gingival Wall. If the cavity will allow it the cervical border should not be extended rootwise sufficiently to carry the margin of the filling under the gum. This form of extension gives greatest security when the entire gingival wall is finished flat, or on a horizontal plane, with the margin finished sharp. Let the retention con-

sist of a groove in the dentin near the enamel labio-lingually (Fig. 11), disappearing gradually toward the pulpal wall.

Labial Wall. As already intimated, this wall should present a zig-zag or crooked outline to obviate a definite line between tooth and filling, blending them, as it were, by lapping onto both sides of the line. If frail the temptation to cut away is but a tendency to follow cavity preparation for gold. It can be shaped to suit any outline possible if sound, except that it should be cut parallel with the axis from the incisal edge down to the dentin (Figs. 12, 13, 14), giving right-angled enamel formation and depth

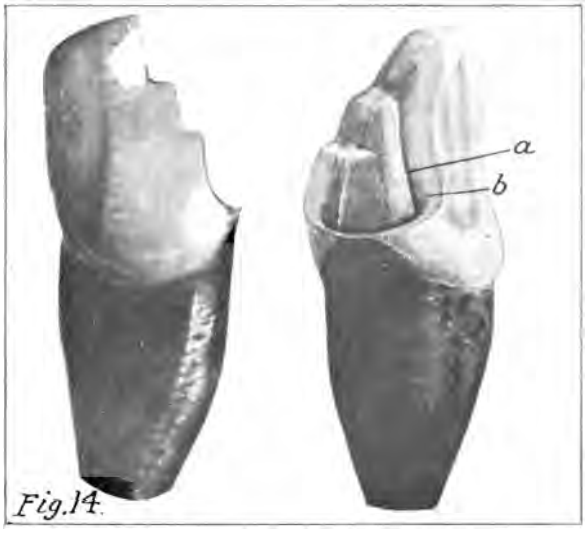


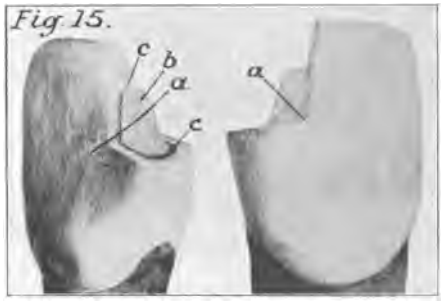
Fig. 14.

sufficient for porcelain to stand. (a, Fig. 12.) From this point to the cervical border it can be given any desired shape, usually taking the form of steps, and being governed somewhat by the position of the dentin covering the pulp.

Lingual Wall. This should be freely cut away if at all frail, to correspond with the labial. Beginning at the incisal edge in sound tissue, cut the enamel parallel with the axis gingivally, rounding it into a union with the cervical floor. (b, Fig. 12.) Should this denude the lingual surface of the dentin it must be slightly but definitely grooved parallel with the enamel borber, as in Figs. 12-c, 13-b or 14-a. The object of such liberal extension is to make room for a bulk of porcelain to support the incisal edge of the filling.

Pulpal Wall. The form of the other walls practically determines the shape of this one. It should be so formed, if possible (Fig. 10), as to assist in making a secure seat for the filling, it being possible, owing to the resistance of porcelain to thermal change, to place it in close proximity to the pulp, thus allowing room for greater thickness of porcelain for strength.

Fractures of Proximo-Incisal Corner. (Figs. 15 and 16.) This condition occurs usually from a blow or accident in the mouths of children, when the pulp is still large. It appears difficult, but owing to the fact that the dentin is free from caries it is not. The procedure is to prepare the incisal angle parallel to the axis, or at right angles to the incisal edge, cutting both plates of the enamel from the dentin as far down as is necessary to form a right-angled union with the



cervical floor (Fig. 15, aa), which is prepared flat and at right angles to the proximal surface, thus giving a right-angle formation to the cavity margin outline, leaving the dentin b entirely denuded. This, supplemented by a slight groove (cc) on the cervical floor and lingual surface of dentin, is sufficient to retain the filling. (Fig. 16, a.) Owing to the protective properties of porcelain, this manner of denuding the dentin is practicable to almost any extent.

The only noticeable difference between cavity formations for incisors and cuspids is with regard to the difference in shape of tooth crown of cuspid from contact point to the occluding end. In large proximal cavities in the cuspids the receding outline of the cusp gives proximal fillings with very acute angles exposed to wear, and while it is true that they are not exposed to direct stress, still the acuteness of angle is such that they are unsafe, and the most reliable procedure is to cut the cusp away (Fig. 17), arranging the margin

on the opposite slope where the exposed filling outline is an obtuse angle and much stronger, thus restoring the entire point of cusp. This plan of cavity outline applies to extensive bicuspid cavities also. (Fig. 18, a.)

Mesio-Distal Incisal Cavities. (Fig. 19.) This cavity is but a union of two proximo-incisal cavities joined across and involving the entire incisal edge on the labial surface, and to a line drawn from one cervical floor across to the other (a, Fig. 19), denuding the dentin of the enamel on the lingual surface. All walls, margins and grooves should incline slightly towards the axial plane, to obviate splitting strains when setting the filling. The only extra retention necessary is obtained by slight grooves (bb) on mesial and distal

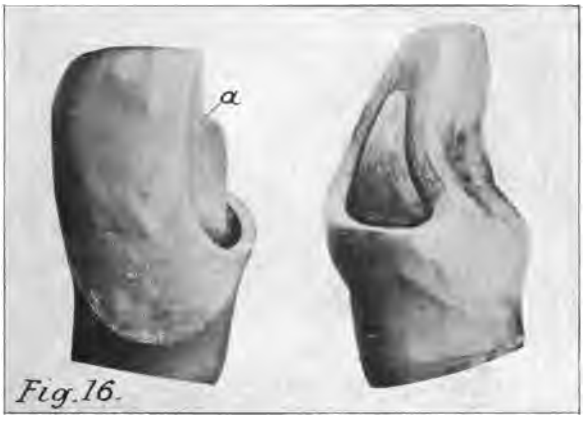


Fig. 16.

puupal walls, and across the incisal end of dentin. (Figs. 19 and 3, c.)

Proximo-Occlusal Cavities in Bicuspids and Molars. The principles involved in preparing these cavities are similar, the same forces working to dislodge them and the same plan of anchorage governing both. They will therefore be treated in common. The plan of cavity outline for these fillings calls for careful consideration of the friable nature of the filling material used, with due regard to the location of the margins and the probable stress to which they, as the vulnerable point, will be subjected. The irregularities on the coronal surfaces present opportunities for concealing the cavity outline somewhat, by selecting depressions through which to extend to fields of safety.

Proximo-Occlusal Molar Cavity. (Figs. 20 and 21.) If the cavity outline naturally falls near the summit of the cusp, cut it away as indicated in Fig. 20, a, bringing the margins from the occlusal out upon the axial surface, through the lingual and buccal fissure (bb, Fig. 20), restoring both anterior cusps with porcelain sufficiently deep to stand, thus removing part of the margin out on to the axial surfaces beyond the stress of occlusion, and leaving all margins on the occluding surface protected by surrounding prominences.

Posterior teeth with extensive mesial, distal occlusal cavities (Fig. 22) are best restored by removing the balance of the occluding sur-

face to secure depth for bulk of porcelain, and facilitate burnishing the matrix, and extend the buccal and lingual margins down to safety.

Strictly Occlusal Cavities. Occlusal cavities in bicuspids and molars are seldom necessary, being usually better and more quickly done with gold foil, but owing to the arrangement of the enamel rods they seldom crumble at the margins. The form of the occluding filling, if the opposing teeth will allow it, is convexed slightly, thus giving much stronger margins and producing a strong prominence to protect them. Cavity formation as given for simple cavities can be applied to these.

DETAILS OF CAVITY FORMATION FOR BICUSPIDS AND MOLARS.

Gingival Wall. This wall should be formed horizontally and grooved, as described in preparation for proximo-incisal cavities (Fig. 20, c). The buccal and lingual walls after being extended are prepared with sharp margins and grooved (Fig. 20, d, d) in the dentin from the occlusal margin down to form a union with the groove on the cervical floor. The pitch of the enamel from the axial walls to the supporting dentin (Fig. 20, e) should follow the lines of cleavage, and round over into union with the buccal and lingual walls, as in Fig. 20, aa, avoiding sharp corners.

The Pulpal Wall. This is shaped so as to give as much room for bulk of porcelain as possible, with the side walls in the dentin nearly perpendicular to insure good anchorage. A retention guide is cut bucco-lingually close to the union of the occlusal pulpal wall with

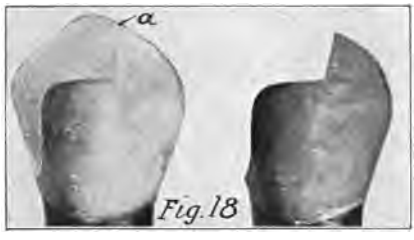


Fig. 18

the pulpal wall of the proximal portion of the cavity, so shaping the entire cavity that the filling can be inserted only from the top.

Proximo-Occlusal Cavities. Bicuspids. It sometimes happens that proximo-occlusal cavities, though extensive, scarcely warrant cutting away the cusps. In such it is possible to prepare the cavity, not cutting out the fissure, and without regard to its occlusal presentation as regards location of margin, and set the filling. At a subsequent sitting cut out fissure for gold filling, and with a fine stone cut an extension into the now occluding porcelain filling, cutting away points likely to fall, and fill with gold, thus protecting the margins of both filling and tooth with gold, and still retain the esthetic effect.

Mesio-disto occlusal cavities in bicuspids are very common, and when cavity is formed as indicated in Fig. 22, a, the filling is very secure and not difficult. The details that require most attention are with regard to so forming the cavity as not to distort matrix when remov-

ing it, to allow depth enough for porcelain for strength, and to leave no sharp prominences in cavity that might cause splitting strains, formation of margin walls and grooves as embodied in details before mentioned.

The subject of cavity preparation for gold inlays can be summed up in a nutshell. The general cavity formation should be as for porcelain, and the margins as for gold foil fillings.

Discussion. *Dr. Joseph Head,* Philadelphia: I do not feel in a position to criticise this excellent paper until I give further thought and experimentation to the subject, yet I must differ with Dr. Thompson's statement that pit cavities in molars and bicuspids should be filled with gold. Of course, a gold filling in those locations is stronger than porcelain, but when patients show the lower surface of the bicuspids and molars in talking I prefer porcelain, and this applies especially in the case of women.

Dr. E. A. Bogue, New York: I would mention two points especially. I worked with Dr. Jenkins one whole week, and needless to say, these large proximal fillings aroused apprehension in my mind, because as time goes by—especially in mouths where there has been any extraction, and there had been in all of these—wear takes place and the occlusion on these brittle porcelain fillings is greatly in excess of that which existed when they were placed. I called Dr. Jenkins' attention to this and he replied that they could be ground down when necessary. It seemed to me, however, that the patient might be thousands of miles away when the grinding would be required.

The essayist said that the fillings should be rounded up a little at the grinding point, but if the occlusion which nature makes, and which we are all after, is as it should be, we cannot afford to round up very much at the lower end of the sulcus between the cusps. The full length of cusp as it exists in each mouth is needed for the retention of the teeth in the position in which they belong. It seems that porcelain fillings, however beautiful and proper in their place, may run wild with us and be put where they should not be.

Dr. T. T. Moore, Columbia: I think as time goes on Dr. Thompson will find that in the restoration of beauty he has not removed all the decayed tooth substance. I thought that these pictures showed considerable decayed dentin left, and if that is so there is bound to be a recurrence of decay.

Dr. W. A. Capon, Philadelphia: I greatly admire the work shown on the screen this evening, and congratulate the essayist. I admire especially the molar and bicuspid preparations—they please me more than those of the incisors, for with the latter in trying to gain the best retention Dr. Thompson has lost the beautiful lines you desire to see in all forms of fillings, especially in porcelain. My only criticism is of the lines, as they are full of angles, making them difficult of operation and preparation. The fact that this work has been done so long and with so much success is sufficient to prove that we will not go far astray in sticking to the older and better established methods of cavity preparation. I do not think Dr. Thompson has any difficulty in following his teachings, but I do not agree with him that steps and these decided angles are necessary in central incisor work. Many people in considering this work do not realize the difference between

the retention required for metal and for porcelain fillings. While these angles may be an assistance in retention, they should be on the lingual surface as much as possible, and leave us the curves so desirable in all beautiful work.

Dr. R. Ottolengui, New York: Although the literature on the subject of porcelain during the last two or three years has been enormous, it has been almost exclusively devoted to the manipulation of material, the management of matrices and the use of various cements for retaining the inlays. Nothing of any systematic or scientific character has been presented on the subject of cavity preparation, so I am pleased to find that three papers along this line are to be read before this body, and this first one is a masterly presentation. Here we have advocated a system of preparation which, although brought out more clearly than in any other paper, is practically what has been the teaching and practice heretofore—that is, a preparation

of the margins of the enamel at right angles to the surface. It has been shown that this formation does not preclude the necessity of having the bottom of the inlay smaller than the top. I think that this right angle preparation of the margins is an error. While I am exploiting a new formation, it is not original with me, having been first shown by Dr. J. E. Nyman. Place a cubical form of inlay in a cubical cavity, and you will have a space surrounding that cube of the thickness of the matrix material used, but with nothing intervening in the way of cement this cube can be dropped in so as to have

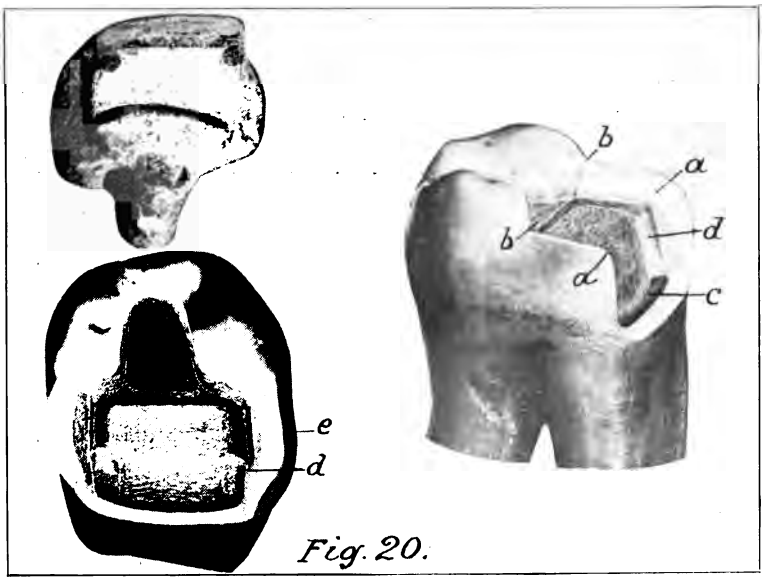


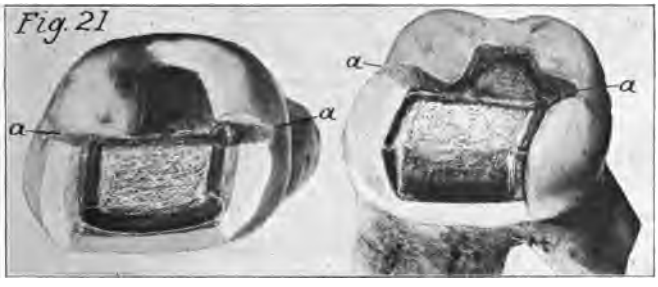
Fig. 20.

contact at the bottom of the cavity, but no manipulation will better the margins; there will always be at least the thickness of the matrix material between the inlay and the border. Have your margins inclined at an angle of forty-five degrees and you will have reduced the space between the lateral walls exactly one-half. Then it becomes necessary to remove from the bottom of the inlay an amount of material equal only to one-half the thickness of the matrix metal to drop it at absolute contact at all points. In spite of all the beautiful diagrams which Dr. Thompson has shown us, I do not believe that the right angle preparation of an inlay margin is the best. By taking a little from the sides you allow an escape of all the unnecessary

cement, but retain enough to hold the inlay, and you have absolute contact at the margins.

Dr. Head: I should like to inquire what cement Dr. Ottolengui uses, that he can so close up the space that there will be no cement between the inlay and the margin. That is the great bugbear—no matter how perfect the apposition may be there is always that line of cement which cannot be avoided so long as cement is made in the form of a powder.

Dr. Ottolengui: I was not speaking of practical work but of the physical principles involved. I wished to show the physical possibility of shaping the cavity wall and then altering the shape of the inlay so that it could be made to fit at every point. The question of whether or not you could force all the cement out of place is not



involved in the correctness or fallacy of this principle, but it would follow that by this means you could get the minimum amount.

Dr. F. B. Noyes, Chicago: I think that in speaking of the inclination of the walls of the cavity with reference to each other Dr. Ottolengui has mistaken the essayist's point slightly. Dr. Thompson stated that the greatest retention was obtained by having parallel walls, but that all inlays should be made with the space slightly wider at the top than at the bottom, and that because of the convexity of the axial surfaces it was possible to have this and still have a right-angled cavo-surface angle.

Dr. Thompson, closing discussion: In reply to what was said relative to zigzag margins, I will mention a case which first proved to me their value. Two similar large mesial cavities in proximating pulpless central incisors were to be filled with cement. One cavity was prepared with symmetrical outline, the other was stepped or notched as deeply as possible on the labial surface, and both were

filled at the same time with the same mix of cement, which was not a very good color. After polishing them it was found that the one with the irregular outline was far less conspicuous than its mate, and the difference must have been due to the irregular outline and the different way in which the light was refracted by its alternating presentation.

With regard to the use of porcelain fillings in simple occlusal cavities in bicuspids and molars, there may be instances where same would be indicated, but only where the patient was very young or infirm, or the teeth through disease were unable to bear the strain that accompanies the insertion of gold. In all other cases foil fill-

Fig. 22.

ings will be more permanent, and if the cavities are large gold inlays are more practical under any conditions unless within the line of vision.

In response to what was said relative to formation of simple cavities to take up the space left by the removal of the matrix, I would say that until we know how much space cement really occupies between the wall and inlay little can be truthfully said on the subject. It is of course well known that the removal of a matrix is certain to destroy the exactness of fit in all cases, particularly in all simple cavities where its removal leaves its thickness of space on all sides of the filling between it and the cavity wall.

To broaden simple cavities at the top presents three points for consideration: First, any divergence to the cavity walls produces

fillings with acute-angled margins which are the most common cause of imperfect final results. The margins of these fillings are usually frail enough without making them more so, and the space is only partially closed unless the cavity is spread beyond all reason or the filling ground off at the bottom. Second, to make cavities that are larger at the top than at the bottom is to decrease their anchorage, making the filling less secure. Third, fillings with thin edges allow cement to reflect through, which is bad.

It has been intimated that it was possible to so shape simple cavities that the outer margins of the filling and cavity would be in absolute contact. The only way to arrive at such a result would be to grind away the under side of the inlay, a practice which should be discouraged because it destroys the certainty of seat, thereby partially destroying the security, inasmuch as the more nearly the filling fits the cavity at every point, and the less cement necessary between them, the stronger the union. Cement, however, occupies some space, and the size of the grains of powder determines how much, because there must be at least that amount of cement in every case.

There is one point, however, which has not been mentioned—namely, the more the matrix is burnished at the margins the thinner it will become at that point. Consequently, after its removal there will be just that amount of porcelain extra at that point, affording the most certain method of partially closing in the cement. Briefly, the less the matrix is burnished in the deep parts and the more it is thinned out at or near the margins the more nearly will the margins of filling and cavity meet.

Dr. Bogue's remarks relative to the wearing strain on occlusal surfaces are timely, showing the necessity of something with better edge strength than porcelain in such places, and also proving the necessity for secreting the margins between cusp prominences for protection that are to be so exposed to masticating stress.

NOTE.—Photographs by Dr. F. B. Noyes, Chicago.

SECTION III.—Continued.

Influence of the Inlay on Modern Dentistry.

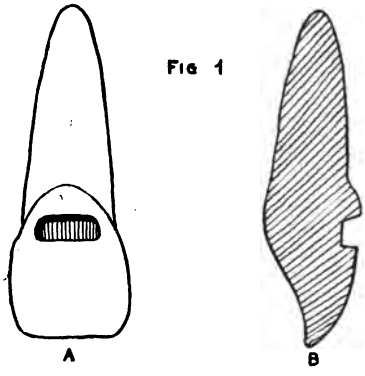
PAPER BY JOSEPH HEAD, OF THE SECTION.

Some years ago the reasons given against the durability of the porcelain inlay seemed so plausible that its advocates admitted that inlays could be permanent only in those unusual mouths where the cement itself was insoluble. Time, however, has proved conclusively that a well-fitting, thoroughly-cemented inlay will last in any mouth. In fact, any dentist who says permanent inlays cannot be made simply means that *he* cannot make them, for years of experience have proved that modern porcelains and cements skilfully manipulated can make fillings which as tooth preservers are unsurpassed by any other type of filling in the world.

The claim that the line of cement, no matter how fine, would through dissolution always prove a fatal weakness, has been triumphantly refuted by time, and the recent statements that oxyphosphate of zinc is a pulp killer do not seem to be based on conclusive data. Pulps die under oxyphosphate fillings and they also die under gold fillings, yet no one accuses gold fillings per se of being pulp destroyers. Oxyphosphate of zinc has saved the lives of too many pulps by its virtue as a filling material to be so carelessly accused, and before it is proved that the theoretical amount of arsenic in the powder, or the phosphoric acid of the fluid, has killed a pulp, it will have to be proved that the pulp so said to have been killed was not fatally infected with germs before the cement filling was inserted. With this objection, as with the other objections that have been raised against inlays, time has proved oxyphosphate of zinc cement to be one of the most valuable filling materials known, and if it really were a pulp destroyer, or powerless to with-

stand the crushing force of mastication—not wear nor abrasion, but crushing force—it is inconceivable that its general use would not have made these objections manifest years ago.

The statement that porcelain cannot withstand the force of mastication is not borne out by general experience. No one who has read Dr. Black's articles or seen his instruments for measuring the crushing force of the teeth can for a moment doubt the accuracy of his individual experiments. These experiments show that two steel molars exerting a straight up-and-down force will require a pressure of from forty to eighty pounds to crush beefsteak, also that the jaw is capable of exerting a pressure of from fifty to two hundred and fifty pounds. Theoretically, then, they would exert



from forty to eighty pounds pressure in masticating beefsteak, but we must remember that practically the triturating motion makes the force actually required considerably less, just as the saw motion of a knife lessens the pressure required. As further proof of the aid given by the triturating motion and saw-like edges of the teeth, all must have noted that frail enamel edges of an insensitive cavity will often break down with but one or two pounds direct pressure of an instrument, yet these edges unknown to the patient will easily withstand the triturating force of mastication. Now, in considering porcelain as a filling material we do not have to consider ordinarily the direct but the triturating crushing strain of which it is capable, and we therefore see why the so-called frail porcelain fillings are able to withstand the force of mastication even in those mouths capable of exerting a direct pressure of two hundred and fifty pounds.

Now we come to consider porcelain inlays in regard to the ever-interesting subject—extension for prevention, and in discussing this let us contrast the ordinary gold filling and porcelain inlay as the two opposite types. In gold we have a non-adhesive filling that is hammered into position, where the slightest mistake in leaving short, unsupported enamel rods will undoubtedly cause a powdered edge and consequently defective margins. That such short rods can readily be left is patent, from the fact that I have seen them in photographs made from ground sections of tooth cavities carefully prepared for student instruction. When, in addition to this, we take into account the factor of personal error that imperils the work of every careful operator, who hammers into position the in-

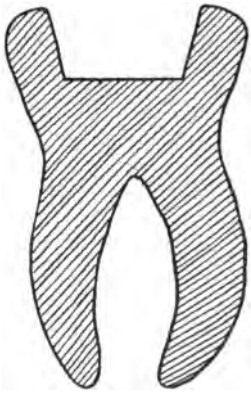


FIG 2

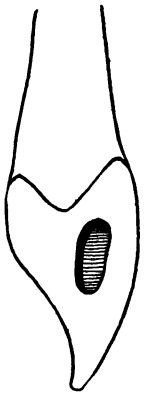
numerable pieces of gold necessary to make a large contour filling, we cannot but feel that the necessity of extension for prevention in ninety-nine per cent of the cases arises more from microscopic defects in the edge of the gold filling than in the general superficial, slowly-penetrating decay as described by Dr. Black.

If there be defective edges extension for prevention will be all the more necessary, as the more infectious material there is on the imperfect edges the more rapidly decay will show itself, and if the defective edge is kept scrupulously clean decay will be so long deferred as to give the filling the reputation of being perfectly made at first. Who has not seen gold fillings with slightly darkened walls remain year after year with the increase of decay so slow as to be imperceptible, and yet these fillings do good service and in spite of defects are successful in saving the teeth. Bearing in mind how these gold fillings with palpably defective edges last for five

or ten years, it is hard to avoid the conclusion that ninety-nine and nine-tenths per cent of the approximal fillings that have recurrent decay have it through primarily defective margins. There are unquestionably in the history of dentistry approximal fillings with perfect margins, as described by Dr. Black, which decay generally all over the surface, but in comparison with the fillings which decay from defective edges these perfect ones are so rare as to be hardly worth considering.

The experience with cemented porcelain fillings seems to bear out these conclusions. The factor of personal error, so far as the edge is concerned, is removed by the presence of an adhesive cement.

FIG. 3



Any short enamel rods that may have escaped the vigilance of the operator are supported by cement, not broken loose by malleting. The filling adheres to the tooth walls with an apposition that is rarely attained by any but the theoretical gold fillings. Thus, when we look at the margins of a porcelain filling and find them free from decay we know that there has been left no microscopic, deep-searching crevice where infection can enter and undermine the very foundations of the filling before the devastation becomes externally apparent. What one of us can have this same feeling of security about his gold fillings? We are all too well acquainted with the cavities that form in the anterior approximal wall of the newly erupted first molars when they are allowed to rest against the adjoining temporary teeth for any length of time. If these are filled with gold without cutting down from the grinding surface,

according to the principle of extension for prevention, we all know how rapidly decay will recur, but if these decayed spots are carefully excavated as simple cavities and filled with porcelain they will seldom if ever show recurrent decay.

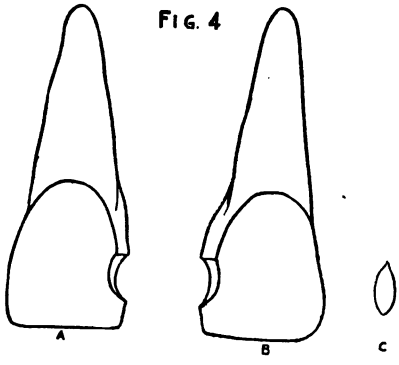
It is true that the porcelain filling always shows a fine line where the cement has slightly washed out, but if this line is so fine as to allow the capillary attraction of the mucus to prevent a constant wash of the solvent saliva along the edge there will be practically no further dissolution of the cement. However, if this line is so large as to make capillary attraction out of the question the cement will be steadily attacked until the filling loosens, but even in these cases it will be noted how seldom decay occurs where the filling is adhesive. If these facts are so, and no experienced porcelain worker will deny them, are we justified in making non-adhesive fillings when we find that adhesive fillings are so much more effective? Take, for example, an ordinary crown cavity in a molar where decay has reached toward the pulp so far as to weaken the buccal or lingual wall. How often does the ordinary gold filling fail here when the ordinary amalgam filling will succeed, and the amalgam succeeds probably on account of its perfect adaptation. But if in such a self-cleansing position we had an adhesive gold filling with perfect edges, barring fractures of the tooth, all will admit that future decay would be impossible. Such a filling I shall now describe, but it must be understood that this filling has been known for the past five or six years.

The cavity should be prepared according to the well recognized principles of Black or Johnson, and the rubber dam should be applied. The fissures should be cut out to the end, and all weak enamel chipped away in the direction of the rods, so as to give edges that are clean and polished. The decay should be thoroughly removed, and the cavity carefully dried and sterilized with any of the well-known antiseptics. Some advocates of extension for prevention are said to rely entirely upon instrumentation to remove the infection within the cavity, but as it is quite impossible to be sure of having removed all of the germs that may have penetrated far into the apparently healthy dentin, the reason for giving up the use of antiseptics in making the toilet of the cavity is not apparent. Cavities excavated thoroughly and carefully filled without the previous use of antiseptics will frequently remain intact, as the few re-

maining germs in the healthy tooth structure will usually wither away like an army deprived of its commissary, but these germs are nevertheless a source of danger that a soaking with alcohol would obviate. This being the case, have we a right to subject our patients to the risk of having an infected cavity when carbolic acid or alcohol is so easy and successful in its application? If anyone fears the action of the phosphoric acid on the pulp he can line the bottom of the cavity with either liquid gutta-percha or celluloid.

The cavity being prepared, the method of inserting the adhesive gold filling is as follows: Moss fiber gold should be annealed and placed near at hand. Some creamy oxyphosphate of zinc should be dropped into the bottom of the cavity and the gold pressed upon it in all directions down to the bottom of the cavity and up to the

FIG. 4



edges, so that but a thin layer of cement will remain and all of the cavity walls be covered by the adhesive layer of gold. Now more gold is pressed firmly upon the bottom of the cavity, and the cement is allowed to set, which process may be hastened by a blast of hot air. When this has been accomplished the gold in the cavity should be thoroughly condensed and more sponge gold added and condensed until a thick solid mass is obtained in the bottom of the cavity. Then with a finishing bur the gold should be smoothed and the edges of the cavity cleansed of any adhering cement. The filling can then be finished with gold leaf or pellets as desired, when we will have an adherent gold filling with perfect margins, a filling where defective edges are out of the question, and where recurrence of decay is practically impossible. The application of this principle to compound approximal cavities is so obvious as not to require further elucidation.

Adherent amalgam fillings can be made in the same way. The cavity should be prepared with sharp, smooth edges, and the alloy mixed to the consistency of soft wax. Then a few drops of soft oxyphosphate of zinc should be dropped into the cavity, and squeezed out by the amalgam being pressed firmly against it into position. The cement should be allowed to set, the edges scraped and cleansed, the rest of the mixed amalgam squeezed dry and added to the amalgam in the cavity until here, too, we have a dense, adhesive amalgam filling that will not discolor.

Here the question arises again, Since recurrence of decay is much less likely to occur around an adherent than around a non-adherent filling, are we as progressive dentists justified in any longer putting in the latter? Having discussed the apparent superiority of adherent over non-adherent fillings, we will now consider how cavities should be prepared for the reception of cemented inlays.

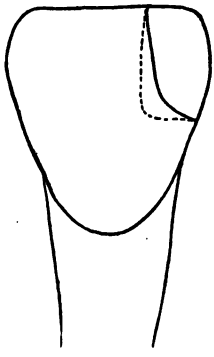
The preparation of simple cavities will be considered, and of these let us make two classes: (1) Simple labial, buccal and approximal cavities on all of the teeth; (2) Simple pit cavities in the bicuspids and molars. As typical of class 1, let us take a simple labial cavity in a central incisor, such as is shown in Fig. 1 (a, front view; b, cross section). In this cavity it will be noted that the floor is made flat, the walls straight and slightly divergent from the bottom, and the margins clean and smooth. The divergence of the walls is for the purpose of letting the stripped inlay settle into the cavity and take up the space previously occupied by the matrix. In all cavities some strong sterilizer should be used just before the cavity is dried and the filling inserted.

In class 2, simple pit cavities, let us take a cavity in the grinding surface of a lower first molar as typical. Here all fissures should be cut out to the end, frail enamel rods broken down, decay removed thoroughly, the bottom made flat, and the sides sloping from it cut at a slightly obtuse angle for the purpose of letting the completed filling take up the room occupied at first by the matrix. The edges should be sharp and polished. Fig. 2.

The simple approximal fillings in the incisors, as before mentioned, are prepared with ease and simplicity according to the lines of Fig. 1, so long as they are purely simple, as in Fig. 3, and have a separation equal to six layers of tape. But when they encroach on the lingual or labial aspects of the tooth, as in Fig. 4, the external

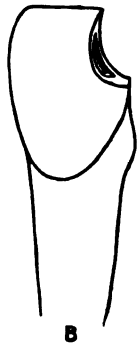
edges of the cavity should be first chiselled to firm enamel and then polished smooth and sharp with a sandpaper disk, so that the outline of the cavity will be in the form of a crescent, as Fig. 4, a and b. Then the flat-bottomed cavity wall within the enamel edges should be finished with a flat-bottomed bur. This will make the finished inlay look something like Fig. 4 c, with frail, flat edges that are readily made to fit the smooth curve of the enamel margins perfectly. Too much pressure while inserting this filling will check the margins, but too much pressure must not be applied, and as these frail edges never receive the force of mastication there is no reason why the operator should not take advantage of the ease with which they can be perfectly adapted.

FIG. 5



A

FIG. 5



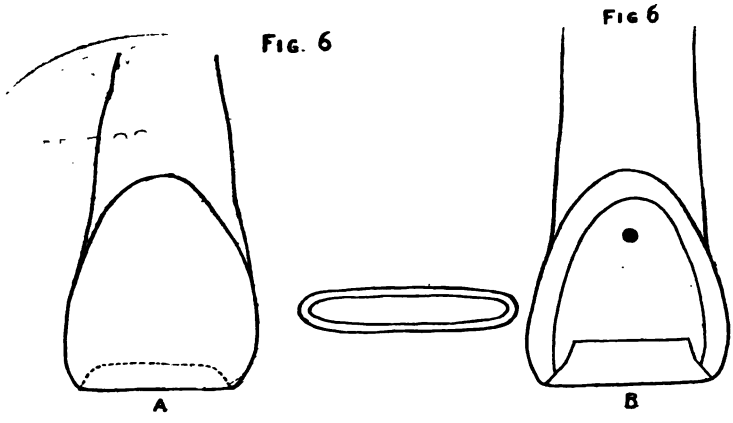
B

In Fig. 5, a and b, where the formation of incisal angles is represented, the lines show the depth of the cavity and the shape of the inlay. As here presented the incisal corners should be cut with a chisel so that all frail enamel edges are removed, and the enamel polished in a curve with a sandpaper disk, so that the juncture of the porcelain and enamel at the cutting edge shall be identical with the direction of the force of mastication. This greatly lessens the danger of the thin edge of porcelain chipping at the point designated by the arrow. The internal walls of the cavity should be excavated according to the dotted lines, with a flat bottom at the cervix running up to a slight groove at the cutting edge. Some gold workers marvel at the small amount of retention used for an inlay meant to restore an incisal corner, claiming justly that gold would

not be secure with similar anchorage, but they do not appreciate the fact that an adhesive filling does not require the anchorage of a non-adhesive filling.

Cavities for incisal tips are shaped as in Fig. 6, a, where the cutting edge is sufficiently broad to get retention, or in Fig. 6, b, where the cutting edge is thin, and a wedge can be cut out of the palatine enamel to the bottom of the cavity for the purpose of greater retention. In the second case the lateral walls of the cavity should be well grooved to overcome the lateral force of mastication. As in all other cases, the enamel edges should be made smooth and sharp either by finishing burs, Arkansas stones or sandpaper disks.

In the compound approximal cavities of cuspids, as in Fig. 7, the same principle holds as with incisal angles of corners, only the



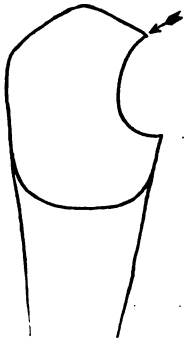
enamel at the cutting edge should be rounded so that the masticating line of porcelain shall meet it at a right angle and so have the maximum strength. This gives a few, short enamel rods at the point designated by the arrow, but as they are supported by cement they are in small danger of fracture, and certainly have more strength than a knife edge of porcelain. In compound approximal cavities in molars and bicuspids the procedure is practically the same. The sides should be cut out according to the lines of extension for prevention, as in Fig. 8. The edges should be smooth and polished, all decay of course being removed. The bottom or cervical aspect should be flat and the sides slope in, so that the inlay must be wedge-shaped, slipping in to take up the space occupied by the matrix. The cavity may or may not be extended into the pit. As

in adhesive fillings, sufficient retention can readily be obtained without the aid of the pit extension, but if such extension is advisable it is of course to be done in the form of the usual step, as is crudely shown in Fig. 8.

In conclusion it may be stated that inlays should be of such shape that the force of mastication will keep them in position, and that they should rely upon the cement to steady them more than to keep them in place.

Discussion. *Dr. G. V. Black,* Chicago: Some of the older men will remember that about thirty years ago a great many practitioners were capping pulps successfully, yet how completely the practice has disappeared. Everybody could save pulps in those days, and any

FIG 7



attempt to convince them to the contrary would have been like trying to dam the Mississippi at flood time. I allude to this simply to remind you that floods come in the thought and methods of the dental as well as other professions and sweep all along with them. This is flood season as regards porcelain inlays, but the problem will be worked out in due time. Meanwhile it is difficult to discuss intelligently many of the questions that come up, because we have not as yet a full view of the subject. I want every man to experiment with porcelain, because it will be of great benefit if it proves up to all that is claimed for it. We should commend the enthusiastic workers in this line who are developing the facts concerning the material. In discussing porcelain inlays we often ignore the conditions present, and the questions of immunity and susceptibility are almost always lost sight of. It is true that imperfect fillings stand

and give good service in some mouths, although they would not last twelve months in a condition of high susceptibility to decay. We must not rely too much on the fact that fillings with black margins sometimes endure, as such fillings in a child or in an adult susceptible to decay would not stand at all. These matters of existing conditions, immunity and susceptibility must be considered in this work as well as with other filling materials.

For many years I have warned against placing antiseptics in a cavity after it has been prepared. I have no objection to antiseptics, but they should be used before the preparation of the cavity is complete. After having applied carbolic acid or even alcohol you cannot get the walls of the cavity in condition to receive a filling except by retrimming them. To be perfect the filling should be built against the clean fresh-cut cavity wall, regardless of whether it is a cohesive or noncohesive filling.

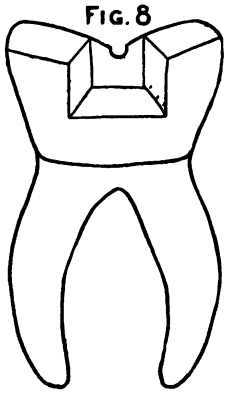
Extension for prevention means simply the extension of the cavity in the direction in which there is most likely to be recurrence of decay, and does not mean extension in other directions, or extension for convenience, or extension for outline. I think the essayist rates too highly the number of failures from the imperfect manipulation of gold, although it is the cause of many. The number of failures from extension or recurrence of decay is much greater than he estimates. I have seen cases where extension was made clear around the angle of the tooth, which is not extension for prevention at all. In proximal cavities extension for prevention is broadening the cavity towards its gingival portion where the teeth lie near together, and towards the axial angles a sufficient distance to allow the surfaces of the teeth to be well apart where the margin of the filling is laid. Any extension necessary beyond that is for some other purpose. The angles of the teeth from occlusal to gingival margin, the axial angles, are safety lines in so far as the beginning of decay is concerned. That is true in all positions from which we work. There is no exception to this rule in smooth surface cavities, and the same holds with buccal cavities. There may be places now and then where decay will commence on an axial angle, but they are very rare. Then extension towards same, not past, is true extension for prevention. The frailty of the margins of porcelain will not allow us to make the best cavity preparation, but we must take the risk and let experience determine what such risks amount to.

Dr. C. Edmund Kells, Jr., New Orleans: Since porcelain inlays have come into such prominence we should not forget to honor the man who first introduced these fillings. About sixteen years ago Dr. William Herbst came over from Germany and gave a clinic before the American Dental Association, showing his glass fillings baked with the Bunsen burner. Jenkins was the next to take it up.

There are fillings in my teeth which my father made thirty-five years ago with noncohesive foil, and they seem good for thirty-five years more. The cavities were wiped out with carbolic acid and creosote. To my mind it is absolutely essential to wipe out the cavity with creosote before inserting the filling, and I have had signal success by this method.

Dr. Jonathan Taft, Cincinnati: I was glad to hear Dr. Black

FIG. 8



say what he did about extension for prevention, for many operators have been laboring under a misapprehension regarding it. In promulgating this method Dr. Black's idea was simply to cut away all decayed tooth structure to a point where the filling would prevent any recurrence of decay. In many cases this is not done even today, for how often defective enamel is left close to fillings, especially in the occlusal surface of molars. Not long ago I witnessed an operation by a dentist of note in which almost all the enamel on the occlusal surface was cut away, yet the tooth was in the main in good condition. Do not go to extremes in either direction, but follow the middle course as outlined by Dr. Black.

I do not believe it is necessary to apply antiseptics to cavities before inserting the filling. Fifty years ago such a practice was

comparatively unknown, and fillings made even as long ago as that are doing well today.

I believe porcelain fillings have come to stay, and while many seem to have a false conception of the facility and speed with which they can be made, the operator who is careful will be successful. The thorough introduction of porcelain will serve a valuable purpose, especially because of improved appearance of fillings, and on account of its causing no thermal trouble.

Dr. Head, closing discussion: One point made by Dr. Black should be especially noted, as many have an erroneous idea of his conception of extension for prevention. He does not mean the wholesale destruction of the approximal aspects of teeth. There is nothing very radical in extension for prevention, and those who have conscientiously lived up to the highest dental art have been practicing it for a long time.

While it is true that some of the older practitioners filled teeth without the use of antiseptics, I believe the greater majority employed them.

SECTION III.—Continued.

Preparation of the Cavity and Use of Pins in Contour Porcelain Inlays.

PAPER BY THOS. P. HINMAN, OF THE SECTION.

The necessity of making porcelain corners, and their retention on broken or decayed incisors or cuspids, has taxed the ingenuity of the most skilled dentists. To properly prepare a cavity in a central incisor, where the mesio-incisal angle is gone (I use this cavity simply as an illustration), the first essential is to cut the mesial enamel wall at a right angle with the labial enamel, and the same procedure is followed with regard to the mesio-lingual wall. Then the mesial enamel walls should be at right angles with the incisive edge of the tooth, for if this angle be an obtuse one there is great danger of the porcelain breaking at this point during mastication. If, on the contrary, this angle be left acute there will surely follow a cleavage of enamel which will make the inlay a failure from an esthetic as well as a practical standpoint. This is really the greatest point of weakness in porcelain contours. Even when the mesial walls are at right angles with the incisal edge there is still some liability of fracture.

To prevent this Dr. Joseph Head suggests that where these chipped edges occur they may be repaired and further fracture prevented by cutting away the lingual wall of enamel on the incisive border next to the inlay and inserting a little cement, into which is pressed sponge gold, and when the cement is hard add enough gold to slightly overlap the porcelain. He says this will form a perfect protection to this weak point, but it is a procedure which I have never tried.

In preparing the basal wall of the cavity I prefer to cut it at a right angle with the axial wall. This holds good for both labial and

lingual enamel and gives a square base on which the porcelain rests. This should be done with a square-end fissure bur, which is kept cool and free from chips by being thoroughly wet with water from a syringe in the hand of an assistant. The mesial and distal enamel walls are then polished by a rapidly revolving cuttle-fish disk, being held at a right angle with the labial surface of the tooth. Great care should be taken to prevent the rounding of the incisal angle.

Swaging Matrix. Plenty of separation having been previously obtained by wedging, the platinum foil is now swaged into place in the cavity. I prefer always to swage the platinum matrix by forcing it into place with a large pellet of moistened cotton, and then with a piece of orange wood trimmed to a wedge shape and inserted in an automatic mallet drive the cotton into the cavity by repeated malleting, which forces the platinum into close apposition with the cavity walls. The many advantages of the mallet are obvious, as it prevents the tearing of the matrix and carries the platinum down between the teeth more perfectly than any other plan I have heard of heretofore. The cotton prevents the plugger from striking and fracturing the enamel margins, as well as holding the matrix in place during the process of malleting.

After using the plugger the margins should be burnished thoroughly with a ball burnisher and the labial lap with a flat burnisher. The matrix is then removed and a No. 3 round bur used to drill a hole in the basal wall of the cavity in line with the axis of the tooth, well in from the enamel margin, but not near enough to affect the pulp. This hole or pit should be about one-thirty-second of an inch in depth.

Threaded iridio-platinum wire 20 gauge is fitted in the pit, and should extend to its bottom and protrude about half the distance between the incisive edge and the basal wall. The portion of the wire entering the cavity should be flattened like a spade, which is done for the purpose of causing the porcelain to readily engage the pin. The matrix is replaced in the cavity and seen to fit perfectly; the platinum is then punctured over the pit and the prepared pin placed in position. The flattened portion extending into the cavity is placed and waxed so that its greatest diameter will be mesio-distally, which prevents the wire from showing through the porcelain after it is baked. The matrix and pin are then removed in a small modelling compound impression, and a model is run in Stone's in-

vestment compound, which does not appreciably shrink, expand or melt in the intense heat of an electric furnace. In compound approximal inlays the same plan is followed, but two pins are used.

Where this is an accidental transverse fracture of an incisor running from the gingivo-mesial angle nearly to the disto-incisal angle a step is used, cutting away the broken portion of the tooth next to the incisal edge and making the axial wall of this step at a right angle with the incisal edge. A small pit is cut in the basal wall of this step and a pin is fitted in the same way as has been described, care being taken not to encroach upon the pulp and not to let the pin protrude far enough beyond the pit to show in the finished inlay. I have used pins of this description in many cases with very good results, and if care is taken the pins thus flattened will not show through the thin labial portion of the inlay.

In conclusion let me add that great care should be used in the selection of cases for contour inlays, for if every cavity needing a contour is filled with porcelain, irrespective of conditions, many failures must be the inevitable result. If, however, care and judgment are used many faces will be beautified where their expression would be marred by a vulgar display of gold.

Discussion. *Dr. L. E. Custer,* Dayton, O.: If I had discussed either Dr. Head's or Dr. Thompson's paper I should have found fault with the mechanical anchorage suggested for the anterior teeth, and I am glad to see that Dr. Hinman has advised securing more stable anchorage for anterior inlays.

Dr. F. B. Noyes, Chicago: I do not wish to be understood as condemning the use of pins for anchorage, but I think we should consider very carefully in individual cases the amount of support which pins will give. The pin furnishes no more support to the filling than the firmness with which it is held in the porcelain. That is, if the pin is placed in the porcelain the support to the filling is not greater than the force required to displace the pin. In an anchorage on the gingival floor which was referred to, with a groove made in the dentin just inside the enamel, and with the walls sloped, it is supported by that much porcelain. The pin is at one point in the gingival wall, while the groove extends the whole distance from labial to lingual in the gingival wall. We must recognize at once that mechanically the groove has greater suitability than the pin.

Dr. Boles, Washington, D. C.: In my experience it is not possible to secure such perfect adaptability to the cavity with pins. My method, especially with anterior crowns, is to make a slight depression at the incisal portion, where the retention is in the cervical, and cut a groove in the corresponding part of the crown. I do not make a groove at the cervical portion because of the step formed there. In other words, I make a tongue in the part that goes into the cavity, and a corresponding undercut in the cavity, forming what is known in mechanics as a key. I have been surprised to see the resistance this offered to displacement, and there seemed to be perfect adaptation.

Dr. C. B. Colson, Charleston, S. C.: There are cases where pins are not indicated at any time, namely, in children's teeth, and it seems to me that all the essayists have neglected to emphasize one important point—the indication for porcelain work in the young. Inlays are indicated in children's teeth of all places, and here porcelain is much better than cement or gold.

Dr. R. B. Adair, Atlanta, Ga.: I am one of those who went crazy over porcelain work and inserted inlays wherever they would possibly stick, so I have some trouble with these cases coming back. At the present time I have three cases of transverse tips, put in with pins as Dr. Hinman has described, and these have broken out. I used a staple and had a pin on either side of the pulp. The inlays did not break, but the enamel on the labial surface of the teeth did, and the fillings are out. It seems almost impossible to repair the damage without cutting off the crown or building out with gold. I would ask Dr. Hinman how he would manage with rather thin teeth having a transverse fracture and the pinholes broken out near the pulp. I don't believe pins in porcelain work are as strong as a ledge of well-baked porcelain.

Dr. Hinman, closing discussion: Dr. Boles brought no argument against pins, and as he has never used them he cannot intelligently criticize them. In Dr. Adair's cases I would say that it was absolutely out of the question to try to use porcelain in a tooth so thin that it would not hold a pin without fracturing the enamel. I cannot suggest a remedy, never having had a case where the inlay broke the enamel. It simply shows that the pin is secure with the porcelain. He would better make a fresh cavity and matrix and bake a new inlay.

SECTION III.—Continued.

Porcelain Inlays in Combination with Cast Fillings and Hood Abutments.

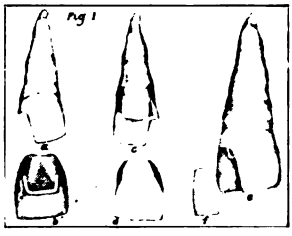
PAPER BY C. L. ALEXANDER, OF THE SECTION.

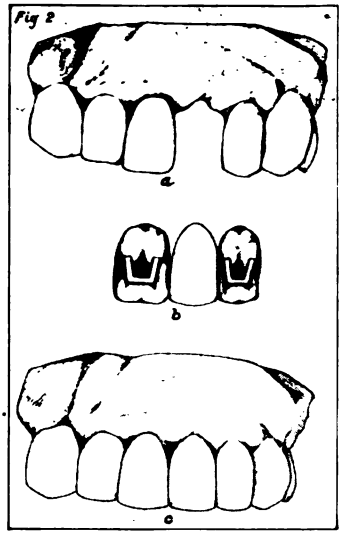
The present demand of all classes upon the dental profession, and one which cannot be ignored, is for a method of restoring lost or broken-down teeth without a display of gold. This demand is imperative, it appeals strongly to our professional pride, and we should rise up boldly and erase from the dental escutcheon the stigma that has been placed upon it by the indiscriminate and vulgar use of gold within the mouth.

An article by Dr. S. G. Perry (DENTAL DIGEST, October, 1903, p. 1220) is no doubt fresh in the minds of all who have been privileged to read it. His conception of the real and ideal so beautifully expressed will hold its place among the gems adorning dental literature. It cannot be read without stimulating the desire to reach the goal which ever moves onward and upward. The doctor's article is filled with love for the beautiful, and it is also tempered with good judgment, which does not take him beyond the point of allowing latitude in which to execute ideas which are practical and in harmony with the real and ideal.

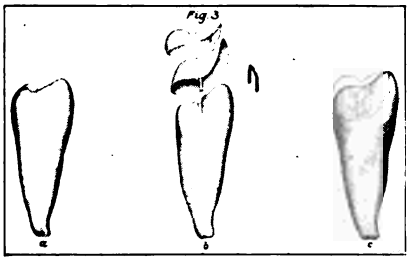
Appreciating the imperfection of the dental art as practiced, I have from time to time given expression to ideas which have presented themselves as being valuable in overcoming some of the failings and which have appealed to me from an esthetic standpoint. One of these I wish to call your attention to especially, namely, porcelain as used in combination with cast restoration for individual teeth and hood abutments for bridgework. My desire has always been for the profession to use these devices without encumbrance, so I have never applied for a patent on them. July 28, 1896, I read a paper before the Southern Dental Association on cast-fillings and hood abutments,

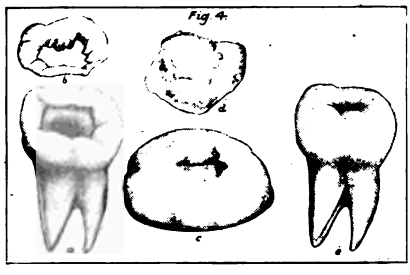
dealing largely with the technique of this class of work. The method as practiced by me up to that time can be understood by referring to the proceedings of that meeting, or to the October, 1896, number of the *Cosmos*. The principles involved there are substantially the





same as those I shall now emphasize, but I shall give them wider scope. I have found that gold .003 of an inch in thickness is more





suitable for making the base of these fillings and hoods, therefore I do not now use the platinum as I did then, nor do I confine myself to the use of pins and posts for their attachment. Later I will call your attention to various other methods that have been in use by me for some years for giving strength and stability to these hoods and fillings. At that time a doubt existed as to the success of the

work, owing to the uncertainty of the durability of the cement used in their retention. Time has removed this doubt, and it remains only to perfect the highest conception of the ideal in this class of work.

Here let me make a digression from the regular trend of thought, in order to point out the difference between a gold inlay and a gold cast-filling. A gold inlay would suggest to the mind the insertion and retention by the aid of some suitable substance, such as cement, of a form of gold in a cavity within the tooth. Cast-fillings, on the other hand, are made in an entirely different way, and cover a field of restoration which cannot be classed as an inlay. The lost parts are restored in wax, from which duplicate casts of gold are made and

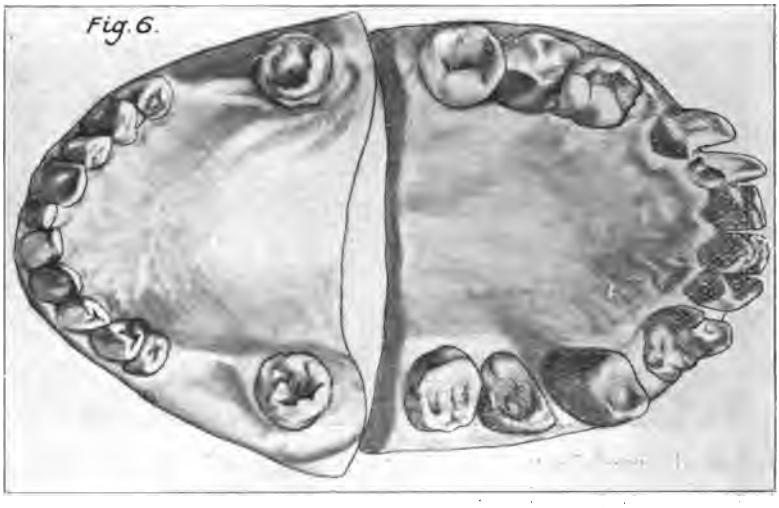
Fig. 5

cemented upon the tooth. The terms inlay and cast-filling do not correctly convey the ideas contained in them, and, while they are in a measure misnomers, I trust they may serve to sufficiently carry the information I am trying to impart, and that some better nomenclature may soon be had for describing these methods.

From the standpoint of utility the cast-work has been a success. By its use we can restore and save teeth which would be consigned to some system of crowning or in many cases extracted. The only annoying objection to it is the unavoidable display of gold. To overcome this feature I have resorted to the use of porcelain in combination with the cast-work, the technique of which I will now endeavor to make plain. We will take for the purpose of demonstration a right central incisor with the corner broken off. First, the cavities are excavated, and the tooth is restored to its original contour with

cement. It is then provided with a gold hood which is burnished to the surface of the tooth, covering the entire lingual surface and cutting edge, the margins are allowed to extend just under the free edge of the gum and to the front laterally, sufficient to prevent the line of margin from being a point of contact with the adjacent teeth when the finished hood is adjusted to its final position (Fig. 1).

Where we have a devitalized tooth the hood is retained in position with a post extending well down into the root. In delicate cases, where possibly the enamel wall is all that is left standing anteriorly, this post receives all the strain to which the tooth is subjected. When operating upon a live tooth the hood is provided with a staple as



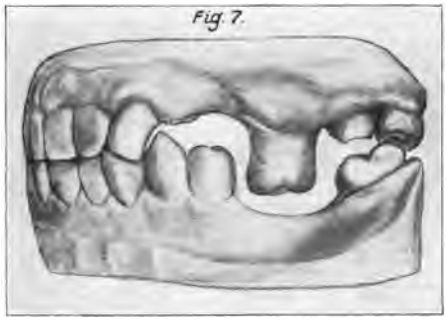
shown in the drawing, a groove having been cut in the tooth to engage the staple. In some cases the staple is not practical and pins are suggested instead, a series of from two to four being used. Sometimes conditions are so favorable for the retention of this work that it is necessary only to make a groove and burnish the gold into it. Often we can omit even this precaution and be certain of successful retention of these hoods. A button or slug of some high-fusing metal tacked to the base of these fillings makes a splendid anchorage.

After the base of the hood is finished an impression is taken, from which models are made showing the work in relief. The gold base is built up with wax as conditions may indicate, then the work is cut away from the model and the wax restoration is covered with

No. 30 rolled gold foil, the lingual surface is left uncovered to permit the gold solder (22 K.) when fused to fill the matrix, which is seen after the piece has been invested and the wax melted out. The hood thus secured is finished and cemented to position on the tooth. The cement used in restoring the contour is now removed and a porcelain inlay made and permanently cemented to its position. An investigation of this method will reveal its merits, for work of this character has strength and beauty and gives satisfaction to the most fastidious.

The following illustrations and descriptions will give the reader a clearer conception of the possibilities of this work than has been set forth in this paper.

Fig. 1a shows a right central with mesio-incisal corner to be restored; b, gold hood with staple attachment; c, lingual surface of tooth, showing undercut into which the staple fits; d, lingual surface



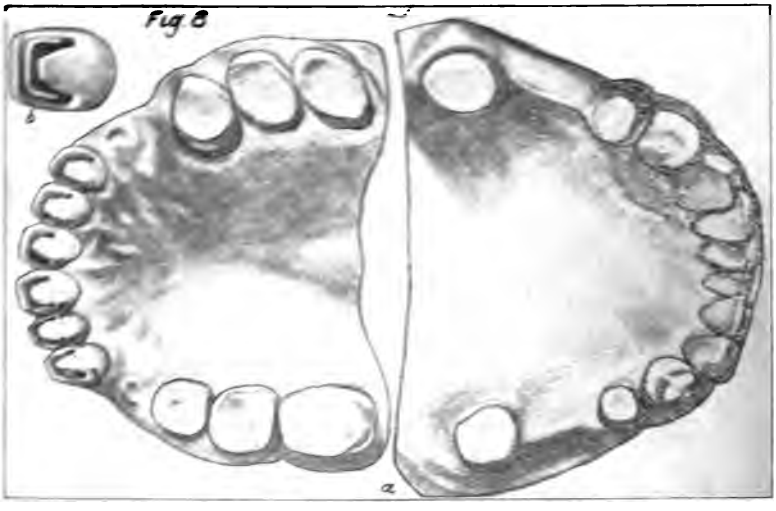
of gold hood; e, tooth shown labially, with gold hood and staple in position; f, porcelain corner or inlay.

In Fig. 2 is shown a method of swinging in one or more teeth with the aid of the staple hood, thus avoiding a display of gold. In cases where the abutments are badly broken down the porcelain idea as described with Fig. 1 may be used to advantage—a, case as presented; b, tooth ready for insertion, showing staple hoods by which attachments are made to the incisors on either side; c, finished case.

Fig. 3 shows a bicuspid with hood abutment in course of preparation; it illustrates a beautiful and substantial way of making an abutment for a bridge or restoring a tooth which has lost its lingual cusp. A, perfect bicuspid tooth; b, broken down tooth showing staple, hood and gold cusp used in restoration; c, tooth with hood abutment and cusp in position.

Fig. 4 portrays a very simple and practical way of making a cast-

filling or inlay. The gold is burnished down within the cavity, after which a piece of wax is placed in position and the patient instructed to close the mouth. This done the work is removed from the mouth and the wax is trimmed from the edges and the occluding portion covered with No. 30 rolled gold foil. The form of the filling thus secured is inverted and invested and the wax is boiled out through the opening which has been left in top of investment. Gold solder is now placed in the matrix and fused until a solid inlay is formed. The cast-filling or inlay thus made is cemented into position and given the final finish on the occlusal surface—a molar with occlusal



cavity; b, gold matrix; c, matrix invested; d, cast-filling or inlay; e, tooth with cast filling in position and thus restored.

In Fig. 5 we have two practical cases, one of which shows the two bicuspids broken down (a) and restoration made by means of cast-hood abutments (b). There is also shown (c) a case with left lateral of which only the enamel wall is standing. In such cases the cast-hood attachment will be found an ideal method of restoration.

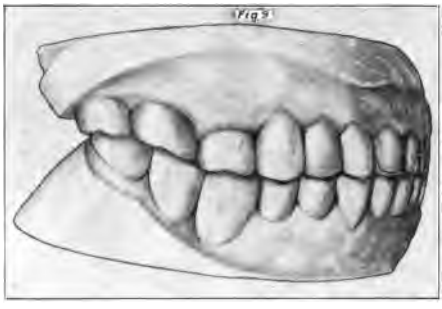
Figs. 6 and 7 represent two views of a case as first received for treatment.

Fig. 8 shows the teeth prepared for staple crown and bridgework.

Fig. 9 represents the case completed and full restoration made. A careful study of the different phases of this case will reveal the many difficulties which had to be overcome.

Fig. 10a illustrates another case where the four incisor teeth are broken down and in course of preparation for staple hood restoration; b shows the same case completed.

Fig. 11a shows case with bicuspids and molars broken down as presented for treatment; b, same case prepared for cast-hood abutments; c, the case showing work completed.



Discussion. *Dr. R. B. Adair,* Atlanta: Nothing has given me so much satisfaction as this hood abutment, and it is one of the most valuable adjuncts we have to crown and bridgework. All that I

Fig. 10

have made are standing up well and giving entire satisfaction. They are especially indicated in anterior teeth with live pulps where you don't want gold to show. In such cases they are a splendid substitute for the old-fashioned open-face crown.

Dr. W. V-B. Ames, Chicago: Some dentists have been annoyed by threats made by Dr. Carmichael of Milwaukee, who claims a patent upon all methods similar to this hood operation of Dr. Alexander. While I admire the results obtained by Dr. Carmichael, I take no stock whatever in the validity of his patent, as I am thoroughly con-

vinced that similar operations performed by Dr. Alexander and myself antedate that patent and would alone be sufficient to set it aside. Anyone who has not seen Dr. Alexander's work should examine his beautiful specimens. I have nothing but commendation for his method.

Dr. H. H. Johnson, Macon, Ga.: The benefit I have received from

Fig. 11

Dr. Alexander's teaching cannot be calculated in dollars and cents. Neither the paper, models nor diagrams do justice to this work—it must be seen in the mouth to be properly appreciated.

Dr. Robin Adair, Atlanta: I have been using these Alexander hood abutments for four years and have never seen one break or wear through or cause any inflammation at the cervical margin. I have swung six and even eight teeth upon them and the work has lasted for years with no evidence of curling up at the thin margins. One of the best cases for this work is in a woman's mouth when the upper incisors have been lost by pyorrhea. By simply cutting a groove on the inner side of the remaining teeth and putting on a hood abutment the pulps are preserved and there will be no inflammation or decay at the cervical border.

SECTION IV.

Physiology, Etiology, Hygiene, Prophylaxis and Electricity.

Etiology.

PAPER BY J. D. PATTERSON, OF THE SECTION.

In the etiology of disease which is of interest to the dental profession, and which has been brought to notice more prominently during the past year, we note statements as to the etiology of dental caries by Kenneth W. Goadby, bacteriologist of the London Dental Hospital, as follows: "Dental caries, like putrefaction, is rarely caused by one species of microorganism, and the reaction of the medium in both caries and putrefaction undergoes fluctuation from acid to alkali, and in both processes an alternation of species takes place according to the phase of phenomena. * * * One of the chief difficulties in discussing the whole problem is to attempt to explain the process of dental caries without having regard to the importance of several rather than a single predisposing cause. * * * Dental caries is not a specific disease due to a certain specific microorganism; it is no definite entity, but a process occurring through the operation of certain biological and physical laws."

These extracts from Mr. Goadby's new work, Mycology of the Mouth, places before the scientific world in a textbook for the first time what different brochures and journal articles have in late years been suggesting, and which is stated in the following words—"It seems not improbable that the various pathogenic bacteria which are to-day associated with disease were at one time simple saphrophytes, and that some of the simple saphrophytes as we know them to-day may yet attain pathogenic powers. * * * Not to admit such a development of pathogenic power entails the obsession that pathogenic bacteria were created by design to destroy human

Dr. Boles, Washington, D. C.: In my experience it is not possible to secure such perfect adaptability to the cavity with pins. My method, especially with anterior crowns, is to make a slight depression at the incisal portion, where the retention is in the cervical, and cut a groove in the corresponding part of the crown. I do not make a groove at the cervical portion because of the step formed there. In other words, I make a tongue in the part that goes into the cavity, and a corresponding undercut in the cavity, forming what is known in mechanics as a key. I have been surprised to see the resistance this offered to displacement, and there seemed to be perfect adaptation.

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teria with diseases of a malignant and progressive type, and which are of great interest in proving how potent a continued local irritant becomes. Prof. Lubarsch of Posen, Germany, says, "Even if the etiologic role of parasites in the causation of disease is to be accepted, there are other causes that must be considered to have at least equal value. Chronic irritation, for instance, especially for many epithelial carcinomata, seems to be an indispensable predisposing condition. Without the preparation of soil, developed by frequently repeated irritation, the epitheliomata fail to make their appearance." This calls to mind what a famous pathologist, W. T. Councilman, said twenty-five years ago—"We are still very much in the dark as to the etiology of tumors. It is certain that we must look to the tissues themselves. There must be some predisposition of tissues. Given predisposition, another factor is necessary, and that is irritation." So it is brought to our attention by the best of authority that whatever the predisposition to lesions and neoplasms we must after all come to the belief that in local irritation is found the prime factor in the etiology of necrobic processes in the jaws if we are to be in harmony with the conclusions of the most careful and diligent scientists on disease.

Dr. Kirk in the article before referred to eliminates all factors in the causation of pyorrhea save a depraved tissue brought about by tissue starvation and intoxication "which renders the individual vulnerable to the invasion of disease-producing bacteria," and says that "we must seek to remove the constitutional vice before we can successfully treat the disorder." Nothing is mentioned of the inciting factor—chronic repeated continued local irritation, which for nearly a half century has stood as the prominent factor in the etiology of diseases in the same class as pyorrhea.

A few other writers and speakers hold the same views, but I give special notice and reference to the expressions of Dr. Kirk on account of his ability and his repeated statements concerning the points mentioned. A logical putting together of etiologic factors in diseases similar to pyorrhea, and careful observation and clinical treatment of a large number of cases, convince me and many observers that Dr. Kirk and others have erred and that their postulates have discouraged attempts at treatment which if intelligently performed would have been successful. Thousands of teeth are lost yearly by the ravages of this disease, and it is my belief that such

a deplorable condition is largely due to the dissemination of statements that the cause is in a constitutional vice and that cures cannot be effected without systemic treatment. This has led many practitioners to entirely ignore local treatment and to tell afflicted patients that curative efforts will be of no avail. It is the bounden duty of every member of this national body to correct this error so that the public may find the best possible relief from this destruction of the dental organs.

Discussion. *Dr. S. J. Spence,* Chattanooga, Tenn.: I wish to urge the importance of dentists being able to diagnose tuberculosis in the early stages. Often we have a better opportunity to do so than physicians. To say nothing of our duty to humanity, our own lives are at stake, for a tubercular patient over whom we are working can by coughing throw these germs of death into our throats and lungs.

Dr. M. L. Rhein, New York: I do not believe that Dr. Kirk or any of the men who take a similar view of the etiology of these diseases has ever intimated that this condition could be satisfactorily cured without proper local treatment or removal of every point of irritation. Everyone whom I have heard discuss this subject from the standpoint of Dr. Kirk has thought that in the serious cases which result in the loss of teeth the irritation is produced primarily through systemic disturbances, and whatever means may be used to remove these points of irritation locally they are futile unless the systemic conditions are relieved or eradicated if possible. This is the point which Dr. Patterson seems to have lost sight of. It is a question whether it is feasible in many cases to remove the pathogenic systemic conditions, and in such cases it is not denied that only constant local attention will keep the teeth in such mouths in position. To illustrate clinically what I have said I might cite a case which Dr. Colson related to me—one of which I have met many duplicates. The patient suffered severely from pyorrhea alveolaris, obtaining relief of only short duration until he began general treatment by means of daily enemas, cleaning out the lower intestine. In a short time all irritation of the peridental tissues ceased and the mouth remained in a condition of health until the enemas were discontinued, when the local condition of pyorrhea returned. This case is but one of many where the local condition of irritation was primarily due to autointoxication—one of the most

common causes of this trouble. The point which I wish to make clear is that it is not denied for an instant that the mere treatment of autointoxication for such evils is insufficient to bring about a relief of the local condition. It is taken for granted that everyone realizes that thorough local treatment, especially as to removal of every extraneous point of irritation, must be most faithfully attended to if the patient is to be benefited. The fact nevertheless remains that however thorough and complete this local attention may be, and however beneficial the results may show, these benefits will be only transitory unless the systemic cause has been properly diagnosed and treated.

Dr. Patterson, closing discussion: Dr. Rhein is in error concerning my views. I agree with him most heartily that pyorrhea is often lessened when attention is given to systemic treatment, but I disagree with Dr. Kirk when he says that a cure cannot be effected without such treatment. Dr. Rhein's criticism is also in error, in that I did not say that Dr. Kirk limited his treatment to the constitutional phase, but that he did say pyorrhea could not be cured without systemic treatment. I hold that in faulty metabolism or any predisposing condition which results in faulty metabolism this condition increases the disease in so far as this predisposition exists, which is true for all diseases, and I claim that, given these predisposing conditions, there must be, as the best pathologists of the world have told us, that local chronic continued irritation before the class of diseases typified in pyorrhea can exist. Given the predisposing condition, which is so great a factor in the ravages of pyorrhea, and which so greatly militates against its cure, I believe there has never been a case of pyorrhea of any description without the local condition of irritation. From the best history I can obtain and the best physical examination I can make, the great majority of patients whom I treat for pyorrhea are absolutely without general faulty metabolism.

SECTION V.

Anatomy, Pathology and Surgery.

Removal of Impacted Third Molars—Stereoscopic Skiagraphy.

PAPER BY C. EDMUND KELLS, JR., OF THE SECTION.

The definition of the word impacted being given as "pressed closely," by impacted third molars I mean those that are "pressed closely" between the ramus of the jaw and the second molar, as will be depicted upon the screen later.

The removal of impacted third molars is doubtless one of the most difficult and least desirable operations we are called upon to perform, and the teachings of some of the leading dental surgeons of the day relative thereto are so greatly at variance with my own methods that I am led to place them before you.

Dr. J. D. Thomas, a specialist in extracting, recommends unequivocally (page 637, American Text-Book of Dentistry) the removal of the second molar in the following language: "In addition to the difficulty in removing these teeth, this severe process of pressing the inner alveolar plate toward the tongue excites a state of inflammation easily communicated to the soft tissues of the throat, and the after-effects assume in many cases such serious conditions that it is better practice to remove the second molar. * * * If the third molar is sound it may remain and cause no further trouble, as the primary difficulty was caused by crowding and pressing upon the second molar; and should it be necessary, from decay, to remove it, the extraction of the second molar first renders the operation simple and easy of accomplishment."

In regard to this it should be noted that by the extraction of the second molar the tooth above it is rendered valueless, and will in all probability in time be lost by exfoliation, and the patient is thus

unnecessarily deprived of a comparatively large masticating area. In a practice extending over a period of nearly twenty-five years I have never found it necessary to thus sacrifice the second molar.

Dr. M. H. Cryer, in his instructions for the removal of these teeth, as given in the American Text-Book of Dentistry, referring to the case shown in Fig. 1, states—"If trouble existed in this region the explorations would have to be made with sharp steel probes. The bone would then have to be cut away until the tooth could be grasped with the forceps." This was written in 1900. In April, 1903, *International Dental Journal,* page 289, in discussing this subject, Dr. Cryer once more reiterates his opinion of the value of steel probes in such cases in the following words: "I have

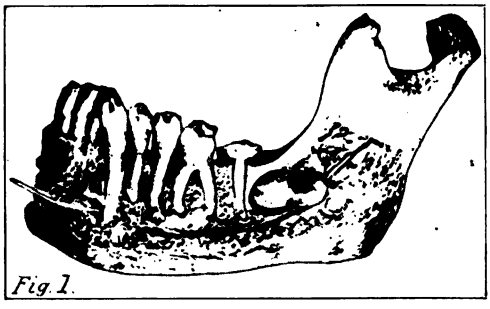


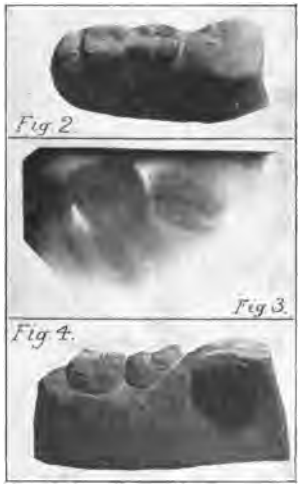
Fig. 1.

been unfortunate so far in having some of our best X-ray men take skiagraphs for me. To-day if I had a case of impacted tooth I would depend upon a good sharp excavator rather than upon the X-ray."

This is certainly a most remarkable statement coming from such an authority. If the author were unknown it should be dismissed without comment, as it discloses a remarkable lack of knowledge upon the value of the Roentgen ray, and it is astonishing that such a distinguished teacher could hold such views at the present day. Referring to Fig. 1, which illustration (taken by permission from the American Text-Book of Dentistry) shows the right half of the lower maxilla, the outer plate having been removed to allow the impacted third molar to be seen, I would call your attention particularly to the dense character of the structure above the tooth in question, and it is through such dense bone as this that we are

instructed to "probe with sharp steel points, and thereby get the location and character of the tooth."

Who is there in this audience that upon the supposition, mind you, supposition only, that there was such an impacted tooth located deeply in that jaw, could have satisfactorily "located" it by "sharp" steel points" and removed it in a creditable manner? I have no hesitancy in acknowledging that such would have been entirely beyond my ability. However, it is fortunate that there is no longer any necessity for such doubtful methods, for since the discovery of the Roentgen ray six years or more ago there has been no occa-

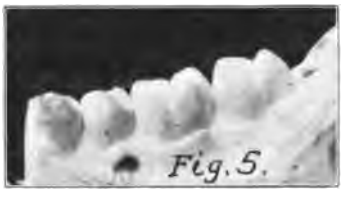


sion to be in doubt about the presence of an impacted third molar, as a skiagraph positively diagnoses the case.

In contrast to this illustration and method I now display a case, Fig. 2, from my own practice. Here was an instance of the lower third molar having been "extracted" eighteen months previously in a dental parlor, since which operation the patient had never been entirely free from pain. Suspecting that the root might not have been removed, although as the model shows no sign of same was visible, a skiagraph was taken with the result as shown in Fig. 3. With this positive guide as to size, shape and location of the offending root, it is hardly necessary to say that it was quite easily removed, and the value of the skiagraphic diagnosis is beautifully verified by a comparison of the root and its skiagraph. Fig. 4.

From the volume already mentioned I again quote from Dr. Cryer—"An impacted third molar causes great distress by initiating an inflammation which extends to the region surrounding the angle of the jaw and often including the temporo-maxillary articulation and soft parts within the mouth. Under these conditions the jaws can be only partly opened, deglutition is impaired, and solid food cannot be taken. One of two things must be done—either the offending tooth or the one in front of it must be extracted."

This statement I am not prepared to deny, though, as before stated, while during my practice I have seen numerous impacted molars, I have not met with such a case as described, although, strange to say, I have seen just such results from ordinary third molars, which were extracted without injury to the second molar and almost immediate relief was given.



It would, therefore, seem that such conditions must be rare. In fact, I will go a step further and say they should be rare. I am sure an impacted third molar could not usually produce the conditions described by Dr. Cryer, in a young patient. They must be caused by pressure due to time. Now the point I wish to make is this—an impacted third molar should be diagnosed by skiagraphy in its early eruptive stage, and once correctly diagnosed as such should be removed without delay. The early removal of such teeth has always been my practice, and doubtless it is due to this precaution that I have not yet seen the serious conditions described by Dr. Cryer, and which would result in the loss of the second molar.

The models to be exhibited of teeth extracted are all of comparatively young people and most of them young girls. During the week just passed two young girls presented, each about to erupt a third molar which in both cases appeared impacted. Skiagraphs revealed the one to be in the correct position and the other locked under the second molar. Is it not much wiser to remove the impacted tooth

without delay, rather than to await the development of trouble which would materially increase the difficulty?

In Figs. 5 is shown an ideal case of the class under consideration.

Examine the mouth and, as the model shows, the tiniest point of the tooth is seen projecting through the gum, and from this visible portion not the slightest indications are given as to the size, shape or position it holds in the jaw. The skiagraph speaks for itself. This gives a general idea of the size of the tooth and shape of the

roots, and shows it firmly locked between the dense ramus and the second molar, with its mesial cusp well under the convexity of the distal surface of the anterior tooth, thus rendering it impossible to raise it without either fracturing the tooth in question or the second molar. With such an illustration before us the question is not, how can anyone question the value of the Roentgen ray in these operations, but rather, how dare the surgeon operate without its use? This patient was a girl about twenty years of age. Was it not my duty to remove the tooth at once, rather than to await troublesome developments?

It does appear to me that I must have had more than my share of these troublesome cases, the result of which was the development of the following mode of operating—1st. The obtaining of a skia-

graph of the region in question, thus displaying the location, shape and surroundings of the impacted tooth. 2nd. The tooth being found securely locked under the second molar, as already shown, the entire mesial cusp is cut away, partly by the aid of diamond cup-shaped disks, which will cut to a limited depth only, and completely by suitable fissure burs in the right angle handpiece. Sufficient of its cusps *must* be removed to entirely free the tooth from the second molar. This is most important.

No burs found upon the market are considered suitable for this work, as they are in many instances too short to reach to the required depth. Again, the cusps of the third molars are usually very dense and hard and the burs as made are very weak. A special instru-

Fig. 9.

Fig. 10

ment, shown in Fig. 6, is made for me for this purpose, which is much more satisfactory.

(ADDENDA.—Since reading this paper, I find that the method as described of using the fissure burs in the right-angle handpiece has been misconstrued. It did not occur to me to say that I did not use it with the bit held in a *vertical position,* for such would be impossible, although some of my hearers assumed such was my method. As just stated, by holding the instrument in that manner it would be impossible to reach the portion of the tooth desired, but if the bit is held *horizontally,* cutting at one time with the handpiece to the lingual side of the molar, and again from the buccal side, and using a saw-like motion, it will be found that most excellent results are obtained.)

3d. The alveolar process situated immediately over the tooth is cut away by suitable round engine burs to as great an extent

as the individual case warrants. 4th. The tooth is now in such condition that it can be raised without injury to itself, the molar in front of it or the bone surrounding it, and an elevator suitable to the case in hand is used for this purpose, working it slowly under the tooth and using gentle but firm pressure. In this manner the tooth is gradually raised well out of its berth, when it may be grasped with forceps and the operation completed.

At times when the crown has been much decayed it has been necessary to drill under the tooth to make an opening for the elevator, but such is not always the case. Absence of decay, of course, facilitates removal. Cutting off the cusps is not usually painful, but the drilling of the process is, and during this work I use a local an-

Fig. 11.

esthetic. Likewise under the influence of this the teeth were formerly removed, but since the advent of the Hurd apparatus nitrous oxid has been used in this stage to very great advantage. Words fail to express my appreciation of this innovation in the administration of nitrous oxid, though I must add that I do not find it necessary to use the chloroform attachment.

The operation as described is not severe, and usually there are practically no bad after-effects other than some soreness. No inflammation or sloughing is to be expected under ordinary circumstances. The patient is instructed to use a warm antiseptic wash from time to time during the day, as long as the soreness exists, which may be for forty-eight hours or so. In one instance only have I had to treat the socket after the removal in this manner of a very refractory tooth, and in that case there were constitutional complications.

Too much importance cannot be placed upon the starting of the tooth from its socket by the elevator, as in its abnormal position no forceps are adapted to grasp the tooth without danger of breaking it, more especially if the crown is weakened by decay.

Prior to the introduction of skiagraphy in my practice the removal of impacted third molars was always undertaken with dread, and, if I must be candid, though I regret the necessity for such an admission, the very difficult ones were usually removed in sections and upon the installment plan, the crown at one time and the root or roots (*perhaps* a year or two) later. However, since the X-ray has been available the operation has been transferred from the realm of guesswork into that of absolute knowledge, and it is with pleasure that I show the models containing the offending teeth which were removed whole in the manner just described.

While I hesitated at first to criticise the methods taught by such eminent surgeons, as quoted, I am now more than ever convinced that the routine of procedure here presented is based upon correct and modern principles, taking advantage of one of the most wonderful discoveries in the world's history, and at your president's invitation I have brought the matter before you. Unfortunately it was only recently that it occurred to me to preserve the records of this work in the models as exhibited, this being the reason of their limited number. Even during this time some of the teeth have been unfortunately lost, and a number of the skiagraphs have faded out through defective photographic manipulation due to inexperience, while others have been lost by sending them away. In each case, however, the fresh skiagraph gave the outlines of the teeth sufficiently clear to render the work successful.

The exhibits are arranged to show—1st. The model of the case as it presented. 2d. The skiagraph of the case. 3d. The extracted tooth placed in its original position in a duplicate model. Several of these will now be shown upon the screen—Figs. 7, 8, 9, 10, 11, 12. I would say, however, that lantern illustrations of work of this character cannot do full justice to the models and films, and those interested are invited to examine the originals which I have with me for that purpose.

Referring to Fig. 11, the following is the history of the case: The patient, a young man about 28 years of age, presented complaining of some soreness in the region depicted, and I advised the

removal of the third molar, explaining how I proposed to do so. Thereupon he made an appointment for the operation, when he returned and the work was performed. I then learned that after leaving me upon his previous visit he was persuaded by a friend to consult the latter's dentist, a man well known to the profession. He advised cutting off the crown of the second molar, the extraction of the third, which would then be comparatively easy, and finally the recrowning of the second. Is it to be wondered at that the young man chose to return to his own dentist, who did not propose to put him through such an ordeal?

In Figs. 13 is shown a case of a young girl, in which there was

every indication of an impacted tooth, but the skiagraph disclosed the tooth to be normal, though well in the ramus of the jaw.

STEREOSCOPIC SKIAGRAPHY.

Regarding the art of skiagraphy, upon the value of which so much stress has been laid, I would say that in July, 1896, it was my privilege to demonstrate the value of the Roentgen ray in dentistry before the Southern Dental Association upon this very spot, and to-day it is my pleasure to lay before this association what is probably the greatest step in the advance of this art, namely, stereoscopic skiagraphs.

As is well known, a skiagraph is strictly a shadow picture, and as such its value in many instances is limited. A subject with a bullet in his body may be skiagraphed and the shadow of the bullet will be plainly seen, but that indicates its presence only and not its location. I will throw upon the screen a shadow picture of a hand,

which is holding a knife clasped within it, but from the picture, Fig. 14, no one not conversant with their relative positions when the picture was taken could assert whether the knife was placed above the hand, within the hand or under it.

So it is with all plain skiagraphs—they can mean but little except to those who are in a position to properly interpret them. Being strictly shadow pictures, they differ radically from photographs, in which all that is visible to the eye may be produced upon the sensitive plates, and consequently can be readily understood by any one. However, by the dental or general surgeon, who either makes the skiagraph himself or understands perfectly under just what conditions it was produced, the skiagraph can be properly interpreted and is most valuable.

It is frequently necessary to localize a foreign object within the

body, and for this purpose several methods have been devised, among which is that of the stereoscopic system, and it is to this that I wish to call your attention. I believe credit is due to Dr. G. P. Girdwood of Montreal for displaying the first stereoscopic skiagraph, which he did in the spring of 1898 at the Toronto meeting of the Society of Railway Surgeons.

Assuming that the principle of stereoscopic photography is perfectly familiar to all, it is only necessary to say that in taking skiagraphs of this character we proceed as in photography, and that is by taking two pictures of the same object from positions exactly 2½ inches apart, care being taken that the focus in both pictures is upon the same point. Then when the resultant pictures are properly mounted and viewed in the stereoscope there is no longer seen a flat picture, but one is practically looking *at* and *through* the object skiagraphed.

Referring again to the hand and knife, let us first take a picture with the tube placed 12 inches above and 1¼ inches to the right

of the center of the back of the hand, and then without moving the hand, change the plate and move the tube 2½ inches to the left (that is, 1¼ inches to the left of the center) and take another picture. The plates are then to be developed in the usual manner, and prints made therefrom, which, being viewed upon the ordinary Wheatstone reflecting stereoscope, will produce the most beautiful and wonderful results. Instead of a flat shadow picture, we now see through the flesh as though looking through a cloud; the bones stand out in bold relief in their relative positions, and the knife can be plainly seen to be held in the palm of the hand, clasped therein

by the thumb. The wonderful beauties of such a picture cannot be described; they must be seen to be appreciated.

What is most remarkable is this—the pictures being taken as seen by the right and left eyes respectively, if viewed accordingly, that is, the picture seen by the left eye in front of the left eye, and the picture seen by the right eye in front of the right eye, the object appears to be viewed from the direction in which it was skiagraphed. But if these pictures are reversed, that is, if the right-eye picture be placed before the left eye, and the left-eye picture be placed before the right eye, then, most wonderful to relate, the resultant single stereoscopic picture shows the object as if viewed from the opposite side from which the skiagraphs were taken. In other words, by simply exchanging the pictures of the hand in question

we may view it from the palmar or dorsal surface as we may choose. However, in viewing stereoscopic skiagraphs, we must remember that we are looking through objects of different degrees of transparency to the X-ray, and it requires some little concentration of attention to obtain fully the beautiful results that are possible. Unfortunately, stereoscopic skiagraphs cannot be shown upon a screen, but must be viewed through the stereoscope, one observer at a time.

Stereoscopic pictures of the teeth are most beautiful. The crowns and roots stand out in bold relief, their contour plainly visible, while the alveolar process presents a transparent but hazy appearance through which the roots are readily seen. Fillings are plainly located

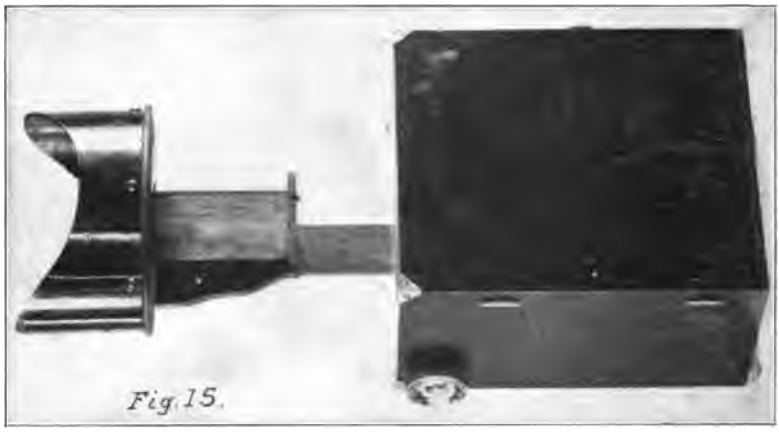


Fig. 15.

upon their proper surfaces, while unerupted teeth may be located upon the lingual or buccal side of the adjoining roots, as they may happen to be.

An ordinary skiagraph is a most wonderful thing, but it is a flat picture, and a glance at it is almost sufficient. Not so with a stereoscopic view. This is not only much more wonderful, but infinitely more beautiful. No passing glance at such is satisfactory, but on the contrary one can gaze upon and study its details, and the longer one looks the more are its latent beauties made manifest.

Almost immediately after entering upon this work I realized that the Wheatstone or the ordinary popular stereoscope could not bring out the full beauty of these skiagraphs, and as a result devised one which I trust will be considered a great improvement upon either in many ways. Skiagraphs frequently lose many of

their beautiful details when printed ever so carefully, and the stereoscope in question allows the originals up to about 3x3¼ inches in size to be viewed direct, while all larger ones are reduced to come within this size, and the glass reductions (in which the details are preserved) themselves are viewed.

In this apparatus, as shown in Fig. 15, the ordinary stereoscopic holder is replaced by a box containing electric lamps and several ground-glass slides which allow more or less light to be thrown through the skiagraphs. In this manner nearly all surrounding light

Fig. 16.

is cut off from view, and thus the details of the picture are brought out to the best advantage by transmitted light.

While stereoscopic pictures of other parts of the body are comparatively easy to make, good dental specimens are difficult to obtain for very obvious reasons. We have first to take one picture, then remove the film from the mouth and replace it by another, and then move the tube and make the second exposure, during which series of operations the slightest movement on the part of the patient will mar the result. However, it is evident that the difficulties are more apparent than real, as I have a number of pictures to show, in-

cluding some of the lower jaw, in which case the difficulties are much greater than in the upper, which must be self-evident.

I will call your attention to one picture in particular, which, though not strictly dental, must be nevertheless interesting. It is of a head with a bullet in it, and the pictures were taken from a living subject.

A very interesting exhibit is that of a bicuspid root carrying a porcelain crown, in which two pins of unequal length may be clearly

Fig. 17.

seen, and which of the two is the labial or lingual may be positively ascertained.

As before stated, this work cannot be shown to an audience like this, but must be viewed individually, and I will therefore hold myself ready at any time to show the views to those interested.

Under the usual methods the work of developing and fixing photographic films and plates is objectionable to dentists, as the chemicals used affect the hands, it being almost, if not quite, impossible to prevent their contact. Again, the manipulation of the very small

films, such as are used in taking dental skiagraphs, is more or less difficult on account of their size, and in the beginning many were spoiled accidentally from that cause.

To overcome these difficulties a system of manipulation was devised by which the exposed film is taken from its protecting envelope and placed in a holder, and from then on the successive steps of developing, rinsing, fixing, washing and drying are carried on consecutively without any of the chemicals coming in contact with the hands, and the film itself is not endangered by being handled.

A film for use within the mouth is cut to a standard size of 1¼ by 1½ inches. After exposure it is taken from its protecting envelope and placed in a glass tube about 3 inches long by 1⅛ inches in diameter, as shown in Fig. 16. You will note that the diameter of the tube, being somewhat less than the width of the film, the latter must be slightly bent to enter the tube, and its elasticity holds it in position therein. From now on through the successive stages of development and completion of the picture the glass tube acts as a holder, the hands need not come in contact with the chemicals, and the transparency of the tube allows of the film being examined from time to time as may be necessary. Fig. 17 shows tube and film placed in jar of developer. One or more of these are placed in an opaque (light-proof) jar upon the rocking machine.

While the development of an ordinary photograph requires but a few minutes of time, a skiagraph may take from five minutes to an hour or more, according to certain conditions obtaining. A rocking machine was therefore constructed, which, being driven by an electric motor, keeps the developing fluid gently agitated for whatever time may be necessary, thus greatly relieving the operator and at the same time producing more satisfactory results.

By the use of the method as described, while I practically do all my own developing, a dental skiagraph does not require five minutes of my own time, all the other stages of work being carried out by my assistant, while I am confident that at no step is she liable to make a mistake and spoil the picture.

While it is possible to carry out all the processes of the making of a dental or other skiagraph in broad daylight, which I have done by the use of opaque jars and a suitably arranged light-proof receptacle, it is my opinion that a dark room will allow the production of better results.

Discussion. *Dr. T. P. Hinman,* Atlanta, Ga.: The X-ray is an acceptable aid in locating delayed or unerupted cuspids, and is very useful in localizing an abscess area. I have visited Dr. Kells on several occasions and can speak only in the highest terms of his methods and work. It would pay anyone to go to New Orleans to see the stereoscopic work, if nothing else.

Dr. L. E. Custer, Dayton, O.: The use of the stereoscope was not mentioned first by Dr. Girdwood, although he was the first in the United States to bring it out, and I believe he used it without knowing what Dr. McKenzie Davidson of London had done. The work of the two men was almost simultaneous.

By the old methods it is almost impossible for the operator to tell the exact position of impacted teeth, and it has been correctly pointed out by Dr. Kells that the explorer does not reveal same. In any event it cannot tell as accurately as the X-ray. This is only one of the many important uses of the X-ray, but you must be convinced from this demonstration that if it had no other advantage it should be used as an aid in diagnosis. Many a good sound second molar has been extracted because we did not know the exact position of the third. Dr. Kells probably has no more of these cases than the average practitioner, but by the aid of the X-ray he is able to tell exactly what is required, while those working without it must depend upon guesswork. There is no doubt that the X-ray has reached the point where it should be largely used in dental practice. It is not expected that every dentist shall develop into an X-ray expert, and in the large cities the X-ray laboratories are a fixed department in the hospitals. Where that is not found, however, a private laboratory is not only practicable, but one of the most valuable adjuncts of which a dentist in a small town can avail himself—not only for his own use, but it will be appreciated by the physicians in the neighborhood, and a physician would rather go to a dentist for his X-ray work than to another physician. Although I live in a city of 100,000 inhabitants, my work for physicians amounts to more than for my own use.

Dr. J. P. Corley, Greensboro, Ala.: Some years ago I reported to the Southern Branch of this Association a case in which a patient suffered from septicemia from an obscure cause. The two prominent symptoms were edema of the left side of the face and constant and severe pain. The patient, while unconscious and with a temperature of 105°, was examined by a physician, a surgeon, an aurist and

a dentist, none of whom found the cause of the trouble. The surgeon finally made an incision through the buccal membranes from the outside of the face and an evacuation of pus followed. This left a fistula which had been discharging for five months when the case came under my observation. The patient was fifty-six years of age and had lost all of the lower posterior teeth fifteen years before. I opened the gum at the point where the third molar would ordinarily erupt, and found that that tooth was back in the angle of the jaw with its longitudinal axis pointing towards the mastoid process on the opposite side. Only one cusp had emerged from the alveolar process, and the tooth was entirely covered by the gum. After temporizing for a week, and gradually dissecting away the fibrous tissue and the fistulous tract, and then cutting off with a bur the alveolar process from one side, I finally succeeded in turning the tooth out. There was nothing abnormal about it except an excementosis on one root, but the discharge stopped and the fistula healed. If the X-ray had been available for this case the trouble could have been diagnosed at once and the patient would have been saved months of suffering and permanent disfigurement.

SECTION V.—Continued.

Ethnographic Odontography—(3) Some Mexican Tribes.

PAPER BY A. H. THOMPSON, OF THE SECTION.

The ethnology of Mexico is beyond definition. It is so complex, heterogeneous and endless in variety and extent that anything like a systematic classification has never been accomplished. The "Catologo de la Coleccion de Anthropologia" of the National Museum of Mexico enumerates over 500 tribes as belonging to the Familia Mexicana within historic times. These tribes in all the centuries known to history, both Indian and Spanish, have been a heterogeneous and incongruous mass of peoples. In ancient times they moved about more or less, but never founded a harmonious body politic, as apparently might have been possible, from contiguous association. In different districts ancient types yet remain as distinct as in the time of the Spanish conquest, and pure blood peoples are not uncommon in our day. Some are noted for their beauty of form and feature, as the inhabitants of the Isthmus of Tehuantepec, and other tribes near them are noted for their ugliness and repulsiveness. These are pure types and have remained unchanged for centuries, and they are so entirely different as to present difficult questions of ethnic relationship. Many tribes, nearly contiguous geographically, are so foreign to each other in physical characteristics that they might have come from far separated parts of the globe, for there has apparently been but little intermixture.

In regard to the general classification of the tribes of Mexico, Mr. H. H. Bancroft in his "Native Races of the Pacific States" says (II, 91): "In aboriginal America (Mexico) in art, thought and religion there is much reason for referring all the native civilizations to two branches, the Maya and Nahua—the former the more ancient, the latter the more recent and widespread. Of all the lan-

guages spoken among these nations the two named are the most widespread and are likewise entirely distinct. * * * Very many nations not closely affiliated with each other show evident traces of both cultures, and may be supposed to have developed this condition from contact and intermixture with the two parent stocks, but this is only general, since there are many nations that show neither Maya nor Nahua affinities. Too much importance is not to be attached to the names Maya and Nahua. The former is adapted to that which is most ancient in the Central American region, where formerly flourished the civilizations that left such wonderful remains at Palenque, Uxnal and Copan—the latter, the Nahua, as being an older civilization than either the Aztec or the Toltec, both of which the Nahua stock includes. * * * The civilization of what

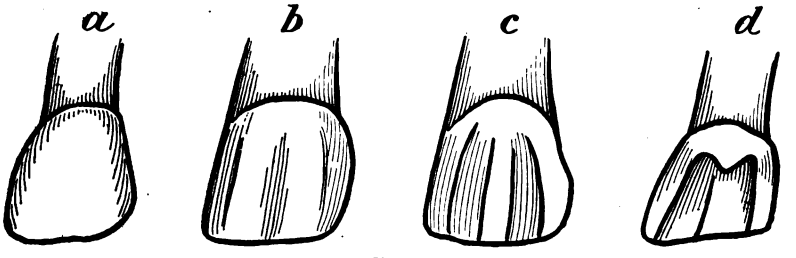


FIG. 1.

Upper centrals of Mexicans. *a.* Narrow neck. *b.* Wide neck. *c.* Ridges on labial face. *d.* Ridges on lingual face.

is now the Mexican Republic, north of Tehuantepec, belonged to the Nahua branch, both at the time of the conquest and throughout the Indian historic period preceding. Very few traces of the Maya element occur north of Chiapas and these are chiefly linguistic. * * * The Aztecs are taken as the representatives of the Nahua element, but the truth is that the Aztecs were only one tribe, the most powerful of a league or confederation of three nations which in the 16th century from their capitals in the valley ruled central Mexico. These three were the Aculhuas, the Aztecs and the Taponecs, and their prospective capitals were Texcuco, Mexico and Tlacopan (Tecuba), which were near each other on the lake borders. * * * Under the leadership of a line of warlike kings Mexico extended her domain to the shores of either ocean and made the tribes therein tributary to her, but the Aztec kings gained prominence, so that the name Aztec came to be applied to all of the

absorbed nations of central Mexico. * * * Many of those nations were of the same blood as the Aztecs, being also of Nahua stock. All their civilization was therefore more or less ethnic. The conquest of the included nations was, however, indifferent and incomplete, and some of them, indeed, were never conquered at all. * * * Of these independent nations one of the most flourishing was that of the Tarascans of Michoacan, westward of the Mexican valley. In institutions, manners and wealth the Tarascans were the equals of the Aztecs, and their superior warlike qualities enabled them to successfully resist the Aztec arms. * * * Their civilization was of the Nahua type, but their language was different from the Aztec tongue. The nation was probably a remnant of the old Toltec empire. In physical development they were superior to the Aztecs. * * * The Zapotecs and Mixtecs occupied the state of Oaxaca. They were distinct in type and from each other. They extended their supremacy over all the tribes of Tehuantepec and constructed the wonderful buildings of Mitla. * * * East of the independent kingdom of Tlascalla was the region of the Totonacs, who were probably a pre-Toltec people, like the Otomies and the Olmecs, who formerly occupied the country and probably built the pyramids of the Sun and Moon at Teotohuacan. They were related to the Nahuas and their architectural remains would indicate such relationship."

The physical characteristics of the people of Mexico are as varied as their ethnic affinities and differences. Bancroft says, "Various opinions have been advanced by competent persons in regard to the features of the natives of Mexico. Mr. Humboldt describes them as resembling the aborigines of Canada, Peru, Florida and Brazil; having elongated eyes, the corners turned upward toward the temple; prominate cheek bones; large lips, and a sweet expression about the mouth, forming a strong contrast to their otherwise gloomy and severe aspect. Others say that their eyes are oval and that their physiognomy resembles that of the Asiatics. According to Prescott, they bear a strong resemblance to the Egyptians, and Le Duc asserts that the Malay type predominates. They have generally a very narrow forehead; oval face; long black eyes—set wide apart; thick lips; teeth white and regular, and nose small and rather flat. The general expression of the face is melancholy, and exhibits a strong combination of moroseness and gentleness." (The centuries of

Spanish misrule and oppression through which these people have passed are quite sufficient to account for the universal hopelessness and despairing expression of the Mexican faces.) " * * * The nations of the valley of Mexico are over rather than under the middle height, well made and robust. In very many they are somewhat shorter, four and a half to five feet, but stout and clumsily made. The women are shorter than the men and are fully developed at a very early age. In Jalisco both sexes are tall, and they are also well built. Among the women are found forms of such perfection that they might well serve as models for the sculptor. Throughout the table-lands the men are muscular and well propor-

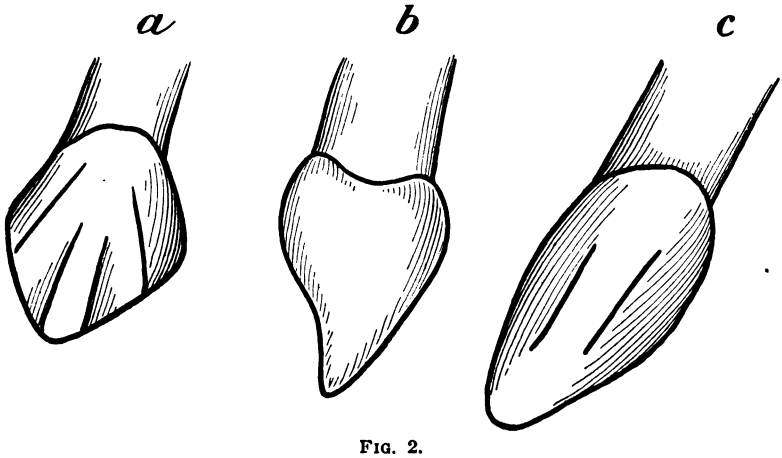


FIG. 2.
Upper cuspids. *a*. Spear-shaped crown. *b*. Mesial view. *c*. Conical form.

tioned. * * * Although some very handsome women are found among them, the majority are not so in old age, which with the women begins early. Their faces are much wrinkled and the features quite harsh. * * * Long, straight, black and glossy hair is common to all; the beard is scanty on most of the men, especially in the capital and its vicinity, where a small mustache is worn. They are remarkable for their strength and endurance, which may be judged by the heavy burdens which they carry on their backs. The inhabitants of the table-lands are of various hues of skin; some are olive, some brown, others of a red or copper color; on the sierra there is a bluish tint of the skin, as if dyed with indigo. The natives of the Tierra-Caliente are of darker complexion, inclining to black.

The Indian pintos, whose cuticle is of less deep color, inclining more to yellowish, are marked with dark copper color in spots. * * * The Zapotecs are well-formed and strong; the features of the men are of a peculiar cast and not pleasing; the women are, however, beautifully formed and graceful, with handsome features. Another tribe of the same nation, the Zapotecs of Tehuantepec, are rather under the medium height, with pleasing oval face and fine personal appearance. A few of them have light-colored hair and fair complexion. The women there also have regular and handsome features, small stature and graceful carriage, with dark lustrous eyes, and are noted for their beauty. Then, again, others near these handsome people are remarkably ugly. The natives of Oaxaca are generally large and well formed; those of the Sierras are of a light yellow complexion, and the women are very white with mild features. Father Burgois in 1540 speaks of the Mixtecs as having beautiful complexions and fine forms. They are of great strength, well built and active. Some others there wear a beard and their aspect is repulsive. * * * In an Oaxaca village shortly after the Spanish conquest the people were reported as being of gigantic stature. * * * The natives of Tobasco who dwell on the river are of medium height, with well developed limbs, flat faces, low foreheads and small eyes, flat noses, thick lips, small but full mouths, white teeth and a tawny complexion. The Ahualcas are rather under the middle height and of great physical strength. They have a low, narrow forehead, prominent cheek bones, full lips, white teeth, small eyes and coarse hair. Their features are aquiline and their expression melancholy. They strongly resemble the descendants of the Aztecs of Mexico valley. The women are more delicately made and some of them are very beautiful."

Prof Frederick Starr of the University of Chicago has made some extensive anthropometric examinations of the people of Mexico, which are published in the decennial publications of the university, under the title of "The Physical Character of the Indians of Southern Mexico." These studies are very elaborate and the data were very difficult to obtain. They were made during several extended trips into the region. His descriptions of the physical characters of the people are intensely interesting and valuable, and throw a flood of light upon the inhabitants of this little-known region. They show that little change has been wrought by inter-

mixture during the lapse of centuries, and that the people remain nearly the same to-day as before the conquest. Prof. Starr dwells upon the great differences and variations that exist among the tribes examined in regard to language, art, culture and physical character. He took measurements, photographs and plaster busts of 125 individuals of each of 23 tribes. He says, "The only classification basis of Mexican tribes has been linguistic, but the relationships indicated by language did not harmonize with the evidence of physical characters as much as was anticipated." In regard to

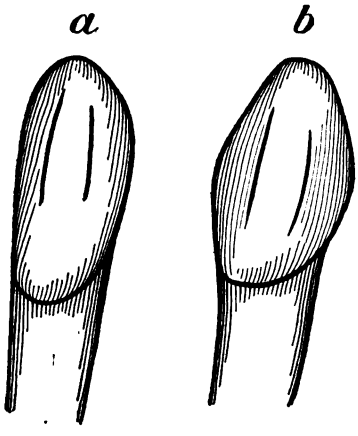


FIG. 3.
Lower cuspids. *a.* Ordinary conical form. *b.* Spear-shaped form.

the cephalic index he says: "It ranges in these tribes from 76.8 to 85.9. Adopting Topinard's nomenclature we find no dolicocephalic or subdolicocephalic tribe, but five mesaticephalic, seventeen subbrachycephalic and one suprabrachycephalic. * * * The Indians of the United States are mostly subdolicocephalic. Among some of the examined tribes the index rises. * * * The nasal index is of the greatest interest, and the actual form of the nose varies greatly. Many of the tribes have finely aquiline noses and others are broad and flat. None of the tribes is leptorhinian. A few are platyrhinian and the rest are mesorhinian.

"The Otomies are of little stature and have absolutely the longest heads of all the tribes examined. * * * There appear to be two types of males—one tall and light yellowish, curiously blotched with red, yellow or blue; the nose is broad and the oblique eyes are

widely separated; the beard is scanty and the hair black. The other tribe is little, dwarf, brown, and has a much more agreeable expression than the broad, flat face of the first. The eyes are widely spaced and the eyebrows often meet. The root of the nose is flat. The women are more uniform and darker than the men and resemble the dark type. They are little in stature and vary from yellow brown to dark brown; the face is flat, the nose broad and flat, the cheek-bones wide and the head very long. The heads of the women and of the little men are peculiarly high.

"The Tarascans are among the tallest of the tribes, less than half being of little stature. Though taller than the Otomies, their neighbors, their heads are shorter. The skin is a fine dark brown; the face is large; the nose is broad and round; the eyes are often mongoloid, and the lips are thick and protruding. The older type has a longer face; the nose becomes narrower; the eyes straighter and more widely separated. The beard is scanty. The women are fleshy and disposed to goitre. This is common with the men also.

"The Aztecs examined were from Cheluda and Tlaxcala. Like the Tlaxcalans, the Aztecs are tall, and their heads are shapely, with a curious bulging of the forehead above the glabella. They are brachycephalic and narrow-nosed. The skin is a fine dark brown, shading at times toward yellow brown or red brown. The hair is black and straight and the beard scanty. There is a large per cent of light brown eyes, but the most are dark. The tip of the nose is often thick, and the lips are often thick and somewhat projecting.

"The Zapotecs of Mitla are not well defined. They are in the category of 'little statures'; the cephalic index is subbrachycephalic; the nose is long but seldom aquiline; the eyes are mostly dark; some black eyes occur; the lips are thick but project but little. The Zapotecs of Tehuantepec present the finest Zapotec type, although they may have some admixture of Spanish blood. They are the tallest of the 23 tribes examined; are subbrachycephalic and messorhinian; the eyes are usually dark brown, but some are light; a few are oblique; the lips are rather thick and projecting; a large hatchet face is rather common; the skin is dark brown, but varies. The women are large and tall—quite so for the men—and are famous for their beauty of form and feature and for their vivacity. Some travelers pronounce them the handsomest women in the world."

These are a few of the many varying types that the inhabitants of Mexico present, indicating the great and extreme variety of the physical features. They are apparently widely distinct, yet they are all of one race and are all of undoubted Indian blood. My studies were made of the skulls and teeth of but a limited number of tribes. Those from the City of Mexico and vicinity were probably mostly of Aztec stock, and after the Aztecs the Tlatelolcos, of the same Nahua race. Those of the Mexican valley were probably of Nahua stock also. Those from the north, the tribes of Chihuahua, are fragments and are greatly mixed. Those from Michoacan are all Tarascan, and are more homogeneous and distinct from the others. Those from Jalisco and Xico are also compact, but the Zapotecs,

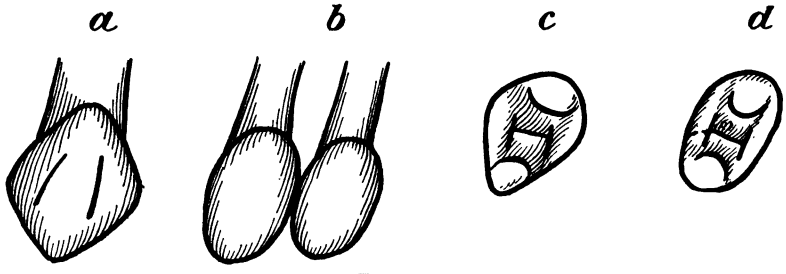


FIG. 4.

Upper bicuspids. *a.* Flaring form of buccal face. *b.* Oval form. *c.* Occlusal face, showing wide buccal cone and very narrow lingual. *d.* Oval form of occlusal face.

Otomies, those from Teotohuacan, etc., are but fragments. The data herewith presented are therefore from mixed and various sources, but a general type for Mexico could not be made out from any quantity of material; the most that could be done would be to make generalizations and deductions for separate tribes. My material was considerably from the City of Mexico—the Tlatelolcos and others—Mexico valley, the Tarascans of Michoacan, Jalisco, Xico, Chihuahua, and from those tribes I could make some reliable deductions. The rest were scattered and miscellaneous and the tribes represented will need to be studied more fully. Taken altogether I examined about 400 skulls and jaws and 500 or more loose teeth. This is not a great number, but it furnishes reliable data as far as it goes. Mexican skulls are very scarce in our museums, and the main part of my material was found in the American Museum of Natural History of New York and the National Museum of

Mexico. Some skulls were also found in the Museum of the Academy of Natural Sciences of Philadelphia, the Museum of Art and Archæology of the University of Pennsylvania, and the Field Museum of Chicago. [NOTE. To the officials and custodians of these museums I must express my thanks and gratitude for the kindness and courtesy shown me in the pursuit of my investigations. My work was also greatly facilitated by the generous assistance furnished by the attendants in these institutions, for which I thank them also.]

The heterogeneity of the tribes of Mexico would of course foretell the heterogeneity of the skull and jaw forms as well as of the teeth. No comprehensive generalizations could be made for the whole of the miscellaneous peoples examined, for there was no uniformity except within the narrow limits of a tribe or region, and even among those there was often great variation of physical characteristics, as has been noted, so the data presented are of value only so far as the limited area of the tribes examined is concerned.

The Skull Forms. The cranial conformations of course presented great variation, yet there are some deductions to be made that may be useful for comparison, within tribal limits. For instance, the skulls from the region of Mexico City and the immediate Mexican valley, the Aztecs, Tlatelolcos and others of Nahua stock, were decidedly round and high, with a remarkable prevalence of high sagittal ridges. The cephalic index was subbrachycephalic with very little dolicocephaly, and few bulging occipitals. There was some fronto-occiptal flattening, with consequent bulging of the parietals; rarely a deep valley ran over between the parietals, but there is some doubt as to whether some of the occipital compression might not be due to earth pressure. Or, again, it might be natural, for some of the living Mexicans exhibit a decided flatness of the back of the head. There were, however, some skulls with very apparent fronto-occipital flattening, of which there could be no doubt, such as is produced by the ordinary cradle-board pressure. This is not uncommon among the Indians in various parts of our hemisphere, north and south. But there was no elongated compression by bandaging, such as was practiced by the Aymaras of Peru, and noted by me. [NOTE. For this and other references to the "Ethnographic Odontography of the Inca-Peruvians," see DENTAL DIGEST for January, 1903.] The forehead was full, with low brow, and the glabella

was not infrequently very prominent. The skulls examined were mainly those of the Tlatelolcos in the National Museum of Mexico.

Among the Tarascans of Michoacan the skulls were large and round, a decided brachycephaly. The middle was high, but there was not so much of the prominence of the sagittal ridge as in the Mexican valley. There was a tendency to dolicocephaly in some, perhaps foreigners, with the frequently accompanying full and even bulging occiput—there being much more of the latter feature than with the Tlatelolcos and Aztecs. The forehead was round and full. Occasionally the valley over between the parietals was dis-

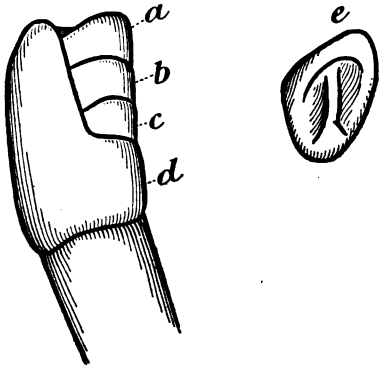


FIG. 5.

First lower bicuspid. *a*. First position of lingual cusp. *b*. Second position. *c*. Third position. *d*. Fourth position. *e*. Occlusal face, showing peculiar form of disto-lingual projection.

tinct. Very few compressed skulls were observed—not one in fifty—and none at all among the Tarascans proper. The Tarascan skulls examined were in the American Museum of Natural History of New York. The skulls from Jalisco (same museum) were large and round; high in the middle; a few with sagittal ridges; some with bulging parietals, some with full occiput, and a decided tendency to dolicocephaly; the forehead was narrow and full, and the brow full. There were no compressed skulls, but some with slight occipital flattening, straight and oblique, which might be natural or earth pressure.

The skulls from Xico (National Museum of Mexico) were round, with full parietals; some with sagittal ridges, and some with very full occiput. There was some decided fronto-occipital compression, with consequent heavy bulging of the parietals, in a few skulls.

The skulls of the different tribes of Chihuahua (from various museums) were generally round and large, with high middle. A very few had the anomaly of the double sagittal ridge. There were many that were long behind, with the full occiput and decidedly dolicocephalic. The full parietals with the valley over the back were also found. The forehead was narrow with full brow. The miscellaneous skulls from different regions, Teotehuacan, Otomies, Huextla, etc., exhibited much the same features.

Although few generalizations can be made, the principal one that I feel safe in deducing is that among the Mexican skulls noted there is a decided predominance of brachycephaly, with high middle of the skull. Dolicocephaly is rare, but is present in some localities, although I was unable to connect it with any particular tribes. Inca bones were found so often that I ceased to enumerate them—they occurred in almost every skull.

The Jaws and Dental Arch. Here also the many variations produced great heterogeneity in the types of the jaws and arches presented. There was also much irregularity and contraction of the arches in all of the groups, which are not enumerated in discussing the apparently normal types. The cranial index and the gnathic index bear a more or less close relationship to each other. Mexico City and valley presented a variety that cannot be classified. The Tlatelolcos had a round arch and a deep vault as a rule. These and other round arches were evidently related to the prevailing brachycephaly. There was a decided absence of squareness of the arch. The arch of the Tlatelolcos was always round, with a disposition to converge at the rear. The miscellaneous Mexicans of the city and valley were usually round also. The latter presented the average width of the upper arch at the first molars of 6 cm. The variations from this were very slight. The Tlatelolcos were also near the 6 cm. average, although a few were above that limit, and many as low as 5 cm. 5mm. Their jaws were small and delicately formed, and indicated, as the skulls did, a race whose physique had been affected by enervating living. They were removed from savage structure and quality. At St. Simon and other valley places V-shaped and contracted arches were not uncommon. The impressive features in this group were the large round arch and the deep vaults. The facial index was usually orthognathous or suborthognathous, for very few were prognathous, the latter not usually being asso-

ciated with round skulls except in very rare and exceptional races. The very full forehead also affected the facial index. This feature is noted by Bancroft and Starr in living races—the descendants of those whose skulls I studied. The racial features have been kept pure and unmixed in many tribes in Mexico for centuries.

The Tarascans of Michoacan presented the general average of 6 cm. width of the arch, although there was much variation. Some few reached 7 cm. and many were down to 5 cm. 5 mm. The arch was generally round and the vault deep. A few V and round-V arches were found, but very few square arches were present. Some converged at the rear and others diverged. A very small number was square and prognathous, the form of facial angle being or-

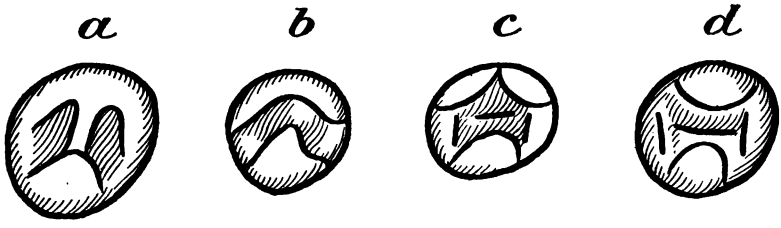


FIG. 6.

Second lower bicuspid—occlusal face. *a.* Transverse ridge form, like first bicuspid *b.* Crescent form of lingual cusp. *c.* Tricuspid form. *d.* Bicuspid form.

thognathous almost entirely. A few vaults were flat, but the most were deep with round roofs. In those from Jalisco the jaws were round and arches rather small. The average width was 5 cm. 5 mm. to 6 cm.; many vaults were low and flat, but the arch was wide and round. A few were round-V, but the most were quite round, some converging at the end and others flaring, but very few were square.

The jaws from Xico were very large, the vault deep and the arch round. The average width was 6 cm. 5 mm. The arches were sometimes disposed to squareness. The Otomies, Zapotecs, St. Juan Teotohuacans, Huextlas and others had large round arches and deep vaults. The average width was 6 cm. 5 mm. The tribes of Chihuahua generally averaged smaller—5 cm. 5 mm.—very few being above 6 cm. The form of the arch was generally round, with many round V-shaped. The vault was usually deep, a very few being low. The surprising thing was the number of round V-shaped arches, meaning those, of course, not deformed but apparently nor-

mal. A few large square arches were observed, especially from Casa-Grande.

The Teeth of the Mexican tribes examined of course presented great variations, and had a few conspicuous characters that are of special interest. The one remarkable ethnic-dental feature of the Mexicans is the excessive smallness of the bicuspids. This was noted to a degree among the Peruvians (op. cit.), but with the Mexicans it was extraordinary—so much so as to be a positive ethnic feature. Whether this peculiar feature will be found to prevail among other tribes than these here observed will remain for future investigations to decide, but as there is a general racial connection of all the tribes of Mexico this feature will probably be found general. Other features of minor importance but of special interest were found, which will be noted in the detailed descriptions.

As regards diseases, abnormalities, malpositions, etc., there was the usual amount that we have become accustomed to expect among peoples who are not essentially primitive. The civilization of the Mexicans, such as it was, induced some kind of enervating life and consequent degeneracy of structure that had its effect upon the teeth. There was marked malposition of the teeth in many cases, so much so as to cause surprise. Not many jaws were much contracted, but a few were saddle-shaped, and a few V-shaped from crowding and malposition of the teeth. Caries, abscess and calculus were not uncommon. Owing to the prevalence of syphilis there was much to be observed of its effects upon the bones, although no notched teeth came under my observation. Destructive abrasion was not so common as with the Peruvian skulls, so that the general effects of wear were not so marked. As the diet of the people was necessarily coarse this is rather surprising. Taken altogether, I found the effects of degeneracy in a marked degree as reflected in the jaws and teeth. The absence of one of the upper centrals was a feature in some of the skulls, and curiously enough this was also observed frequently on the streets of Mexico City in all classes. A practitioner assured me that it was due to an obstinate disease of the gums, of deeper origin than pyorrhea. The coincidence of the loss of the central incisor in both the ancient skulls and their living descendants was quite impressive.

The upper central incisors of the people of the City of Mexico

and the valley presented some interesting features. The National Museum of Mexico had, in addition to the skulls, many hundreds of loose teeth of the Tlatelolcos, which gave a complete representation of the dental peculiarities of these people. The upper centrals among them had the main feature of a wide face for the lower half of the crown, the upper half converging to a narrow neck, with a deep fossa on the lingual face with high ridges (Fig. 1). Some few had long crowns with wide neck and round face. Ridges on the labial face were very rare, this being a low and simian type. A rare form was a long crown, wide to the neck, with enamel extending

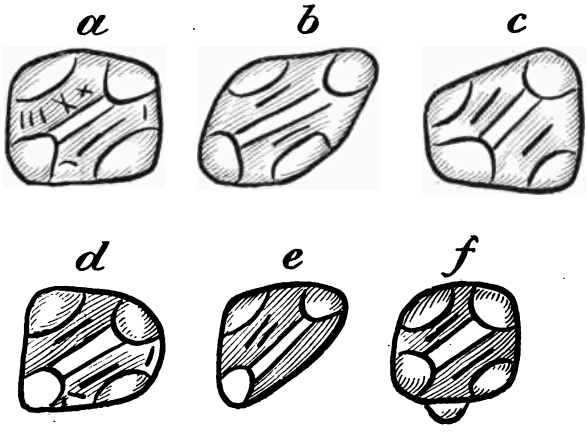


FIG. 7.

First upper molar—occlusal face. *a*. Usual square, normal form. *b*. Diamond form, paracone and hypocone reduced. *c*. Trapezoidal form, paracone and protocone reduced. *d*. Trapezoidal form, metacone and hypocone reduced. *e*. Triangular form, hypocone entirely absent. *f*. Fifth cusp, hypoconule, added to protocone lobe.

high up on the neck, and the labial ridges well marked. This type must have been intrusive, for it is of decidedly savage and primitive relationship. There was but little variation among the Tlatelolcos from the main type of the wide lower half of the crown, narrow neck and deep lingual fossa. The roots were usually long, some of them having great length. Very short "stubby" roots were rare—such as are often found with extra large, wide crowns. There was not as much wear of the incisors as is usual with such races as the Indians. The Mexican valley tribes presented much the same type.

Among the Tarascans the prevailing type of the centrals was

that of a very broad or flat face, and wide neck. There were some with narrow necks and wide crowns, but the majority were long and flat. The labial face was smooth, with little suggestion of ridges. The lingual fossa was not deep, and consequently there were but slight lingual ridges. Some of the anterior teeth had notches filed in the edges of the crowns, as was a ceremonial custom of some sort with the Mexicans, and this marking shows in their idols also. In Jalisco the centrals were of the wide crown and narrow neck variety. From Xico they were of the same shape, with occasional cases of ridges on the labial face, showing this primitive type. Those from St. Juan Teotohuacan had the type of wide face, narrow neck and deep lingual fossa. Some few had labial ridges. The Zapotecs were the same. In the miscellaneous collection of tribes of Chihuahua there were some which had the primitive labial ridges, with wide crown and wide neck, a very low type. Some, however, had wide lower crowns with narrow necks, but they were exceptions.

Taken altogether, I found two distinct types of incisors, which, with a more exhaustive examination, might be found to be associated with a distinct ethnic family. The first type was that of the lower half of the crown with a narrow neck, smooth labial face and deep lingual fossa with high ridges. The second type was that of the wide crown, short or long, with a wide neck, well marked labial ridges and smooth lingual facial modifications. A third type was rather aberrant, with a very large smooth crown and very short root. These types were found in various combinations, of course, yet they were distinct.

The upper lateral incisors among the Mexican tribes examined presented some interesting features, and yet were not as variable as we might expect. There was comparatively little degeneracy in form—such as is common in the lateral in Europeans. The peg-shaped form, for instance, was most rare, and total absence of the tooth almost unknown. In some tribes the degeneracy was more marked than in others, following the same line of degeneracy of associated parts. Among the peoples of Mexico City and valley —especially the Tlatelolcos—it was usually of good form and followed the centrals as regards the special types it exhibited. It had the wide crown and narrow neck of the centrals of the Tlatelolcos, with very deep lingual fossa and high ridges. Labial

ridges occurred in some low types, as on the centrals. The lingual basal ridge was sometimes cut by the groove which often runs across this ridge and over onto the neck, but this defect was not common. A peculiarity was a deep groove extending across the distal face and over onto the labial face in several cases. The rare reversion to the primitive lateral form of the high cingule on the lingual face rising to the level of the edge—making a bicuspid type—was observed in a few cases. Peg-shaped crowns were rare. The mesio-labial angle depression occurred in some. The roots of the laterals were long and flat, with the obtuse hook in many cases. A few roots were rather short.

The Tarascans had laterals that were not so full shaped, but were rather degenerate, the peg shape being not uncommon. Some were

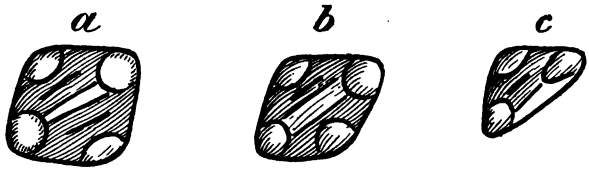


FIG. 8.

Upper second molar—occlusal face. *a.* Square form, like first. *b.* Hypocone reduced. *c.* Triangular form, hypocone entirely absent.

flat-faced, narrow neck, deep lingual fossa, and groove over lingual ridge. Deficient crown and wide neck were common. Some were of good shape, but not many. Those from Jalisco, Xico, St. Juan, Teotohuacan, etc., had the laterals of good shape—wide crown, narrow neck, lingual fossa, etc. From Zapotec the crowns were small and narrow. From Chihuahua the laterals were rather wide and flat, with narrow neck, lingual fossa, etc. Among this mixed lot there were, of course, many different forms. There were some cases where it was totally absent and the arch was closed.

The lower incisors presented little variety, as might be expected. In the strong types they were full and square, the width of the centrals and laterals not being as unequal as with the higher races. The edge of the lateral was usually wide and square, the distal angle being but little round. The size of the neck varied in the same way as between the higher and lower types, as the centrals. With the Tlatelolcos the lower incisors were unequal and narrower than with some other tribes. The Tarascans were marked by the very

wide edges of both centrals and laterals—the differentiation as between those teeth in higher races not being apparent. In those from Jalisco, Xico, Teotohuacan and the Otomies this type also prevailed. The Zapotecs had them smaller and narrower. In Chihuahua the various tribes presented considerable variation, both wide and narrow being found. There was among most of the tribes examined considerable irregularity of these teeth, malposition and tortion being frequent.

The upper cuspids presented some strong characteristics that are of interest. Some of them were worn and dry-fractured, but the number of whole specimens was unusual. They ranged from small to medium, not being very large or long. This is in harmony with the prevalent round arch among the Mexicans, which is not characterized by as large, prominent cuspids as the square arch, in which they stand out so noticeably at the corners. The two prevailing types were the wide, spear-shaped crown, usually short, and the long conical crown, and their variations. (Fig. 2.)

Among the Aztecs and Tlatelolcos of Mexico City and valley these range from the small, short crown with wide face to the large, long and conical type. The variations seem to be very great. A few have the good spear-shape of the labial face, with flaring distal and mesial borders; others have the full, round labial face with reduced borders and of a distinct conical shape. An average as to the proportion of the two forms would be difficult to make. There were only a few very large cuspids of the long, thick, strong variety, with thick necks and long roots, but short roots were most common. Labial and even lingual ridges of any prominence were most rare.

Among the Tarascans the cuspids were generally of large spear-shape, the distal prominence being much in evidence. There were quite a number of conical-shaped crowns, but not so many as among the Mexican valley tribes examined. The roots were sometimes long but generally medium, and the labial and lingual faces were smooth with little evidence of ridges. Some of the cuspids, like the incisors, had notches filed in the edges.

In those from Jalisco the cuspids were generally short, with full round face, thick neck, and but slightly flaring or spear-shaped. From Xico they were remarkably large, long and conical. The Otomies and the Teotohuacans were large and rather spear-shaped,

some being conical. The Zapotecs were round and wide, of decided spear-shape. The tribes of Chihuahua had cuspids that were rather large and spear-shaped, very few conical crowns being found among them.

The lower cuspids were generally of the ordinary conical type, flattened on the mesial side or less flaring on the distal (Fig. 3). The Tlatelolcos had rather full distal prominences and frequent lingual ridges. The latter feature was very marked. The cusps were high and sharp where not worn. One or two were of marked reduction in size, like small conical supernumeraries. The strictly conical form was of course most usual. Among the Tarascans these teeth were mainly of conical form, and ranged from small to large. A few were wide at the distal with an approach to the spear-form.

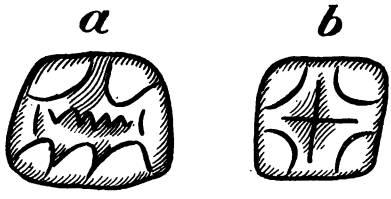


FIG. 9.

Lower second molar—occlusal face. *a.* Five cusped form of normal first molar, found (as ancestral type) as a reversion in second molar. *b.* Degenerate but usual form of quadri-cuspid type of lower second molar in higher races.

The great majority, however, were of decided conical shape, with a sharp point when not worn. Of those from Jalisco, while the ordinary type predominated, there were many with a flat face, flaring borders and an approach to the spear-shape. Those of the Xico, Teotohuacan, Zapotec and the tribes of Chihuahua were decidedly conical. A very few indicated an approach to the spear-shape of the upper cuspid.

Bicuspids. Coming to these teeth we find the most interesting and unique feature to be observed among the Mexicans in regard to the ethnic characters of the teeth, namely, the *excessive smallness* of the bicuspids. These teeth are nearly all below the average size, in comparison with the other members of the same denture in Europeans. Usually they are extremely small, deficient in development, sometimes deformed, and even peg-shaped. So far as my observation and information goes this feature is unique with the Mexicans. Dental practitioners in Mexico assured me that it prevailed with the living Mexicans also. A more extended study of the

ethnic characters of other peoples of all parts of the world might disclose others who have this feature also. Of course some other American Indians probably have it to a degree, as has been noted of the Peruvians (op. cit.), but the Mexicans so far exhibit the most marked manifestations of this interesting characteristic. It seems to be ethnic. As remarked before, this excessively small size of the bicuspid seems to militate against the Mongolian theory of the origin of the American aborigines, for the Mongoloid peoples of Asia all have, so far as noted, very large bicuspids as compared with the other teeth of the same denture. Further study may yet disclose an Asiatic or Polynesian race who have small bicuspids, and this discovery would assist materially in tracing the origin of the American people. Thus a definite value would be placed upon the science of ethnographic odontography, as on other stomatological studies that have an acknowledged ethnic and diagnostic value. This is one of the objects of the elaborate prosecution of these investigations.

The first upper bicuspids among the Aztecs and Tlatelolcos ranged from small to medium; a few were good sized, with the marked features that the prevalent outline of the buccal cone was very wide mesio-distally, and the lingual cone very narrow (Fig. 4). Square or oval crowns were rare. In those of the Mexican valley this type also prevailed, and among them some of the very small crowns were found. Bifurcation of the root was the prevailing type and an occasional three-rooted specimen occurred. Among the Tarascans this tooth was small—some very small—with the usual wide buccal cone and the narrow lingual. A very few were flat or oval in outline, but flatness from interstitial wear was notably absent. The prevalence of the very small crown with poorly developed features was impressive. In those from Jalisco the crowns were from medium to small, with the wide buccal cone and narrow lingual. A few were flat or oval. The Otomies were the same. In those from Xico were found many of the very small type, as well as among those from St. Simon and Teotohuacan. From Chihuahua they were generally small to medium.

The second upper bicuspid presented a larger percentage of very small crowns. Among the Aztecs and Tlatelolcos the prevailing type was very small with oval outline. A few had the wide buccal cone with narrow lingual, which were larger. From St. Simon and

the Mexican valley they were quite small, with the wide buccal and narrow lingual outline. Among the Tarascans the types ranged from small to very small, with the wide buccal and narrow lingual outline. A few were medium and oval. The small type was quite prominent, some being smaller than the first bicuspids beside them, and a few were even peg-shaped. Those from Jalisco ranged from small to medium. The collection of miscellaneous tribes was about the same, with some very small examples. In Xico they ranged from very small to medium, with oval outlines. The Chihuahua tribes were about the same.

It should be observed that a more extensive survey should be made, with the arrangement of the observations in a statistical order. The unique feature of the excessive smallness of the bicuspids of the Mexicans could then be more fully brought out, but my limited material in some directions was not sufficient to make statistical tables impressive.

The lower bicuspids presented the same remarkable feature of smallness in size, and sometimes they were diminutive. They averaged smaller than the uppers. The usual special features of the occlusal faces of the two lower bicuspids were reduced and indistinct. In fact, many of them were quite like undeveloped and imperfect teeth. The remarkable reduction of size and functional form had a more degenerating effect upon them than upon the upper bicuspids.

The first lower bicuspids among the Mexican city and valley people and the Aztecs and Tlatelolcos ranged from medium to small, the majority being very small. Those occurring most frequently were the very small and deficient crowns, and of these there were many. Only a few were full size, and large crowns were very rare. The buccal face was not full and bulging, as is normal with this tooth, with the buccal cusp leaning lingually. Like other features, this was deficient. The lingual cusp varied greatly as to height, as might be expected with the degenerate type of the bicuspids (Fig. 5). The lower third position was that of most frequent occurrence, and next was the second position. Very few had the first position—the full, simple bicuspids. A good number were the fourth position, which is a very primitive type, recalling the low cingule of the insectivora and the lower quadrumana. (See Peruvians, op. cit.) The curious insectivorous reversion of the disto-

The skulls of the different tribes of Chihuahua (from various museums) were generally round and large, with high middle. A very few had the anomaly of the double sagittal ridge. There were many that were long behind, with the full occiput and decidedly dolicocephalic. The full parietals with the valley over the back were also found. The forehead was narrow with full brow. The miscellaneous skulls from different regions, Teotehuacan, Otomies, Huextla, etc., exhibited much the same features.

Although few generalizations can be made, the principal one that I feel safe in deducing is that among the Mexican skulls noted there is a decided predominance of brachycephaly, with high middle of the skull. Dolicocephaly is rare, but is present in some localities, although I was unable to connect it with any particular tribes. Inca bones were found so often that I ceased to enumerate them—they occurred in almost every skull.

The Jaws and Dental Arch. Here also the many variations produced great heterogeneity in the types of the jaws and arches presented. There was also much irregularity and contraction of the arches in all of the groups, which are not enumerated in discussing the apparently normal types. The cranial index and the gnathic index bear a more or less close relationship to each other. Mexico City and valley presented a variety that cannot be classified. The Tlatelolcos had a round arch and a deep vault as a rule. These and other round arches were evidently related to the prevailing brachycephaly. There was a decided absence of squareness of the arch. The arch of the Tlatelolcos was always round, with a disposition to converge at the rear. The miscellaneous Mexicans of the city and valley were usually round also. The latter presented the average width of the upper arch at the first molars of 6 cm. The variations from this were very slight. The Tlatelolcos were also near the 6 cm. average, although a few were above that limit, and many as low as 5 cm. 5mm. Their jaws were small and delicately formed, and indicated, as the skulls did, a race whose physique had been affected by enervating living. They were removed from savage structure and quality. At St. Simon and other valley places V-shaped and contracted arches were not uncommon. The impressive features in this group were the large round arch and the deep vaults. The facial index was usually orthognathous or suborthognathous, for very few were prognathous, the latter not usually being asso-

ciated with round skulls except in very rare and exceptional races. The very full forehead also affected the facial index. This feature is noted by Bancroft and Starr in living races—the descendants of those whose skulls I studied. The racial features have been kept pure and unmixed in many tribes in Mexico for centuries.

The Tarascans of Michoacan presented the general average of 6 cm. width of the arch, although there was much variation. Some few reached 7 cm. and many were down to 5 cm. 5 mm. The arch was generally round and the vault deep. A few V and round-V arches were found, but very few square arches were present. Some converged at the rear and others diverged. A very small number was square and prognathous, the form of facial angle being or-

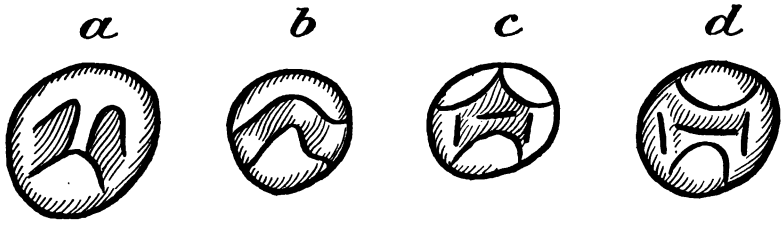


FIG. 6.

Second lower bicuspid—occlusal face. *a.* Transverse ridge form, like first bicuspid *b.* Crescent form of lingual cusp. *c.* Tricuspid form. *d.* Bicuspid form.

thognathous almost entirely. A few vaults were flat, but the most were deep with round roofs. In those from Jalisco the jaws were round and arches rather small. The average width was 5 cm. 5 mm. to 6 cm.; many vaults were low and flat, but the arch was wide and round. A few were round-V, but the most were quite round, some converging at the end and others flaring, but very few were square.

The jaws from Xico were very large, the vault deep and the arch round. The average width was 6 cm. 5 mm. The arches were sometimes disposed to squareness. The Otomies, Zapotecs, St. Juan Teotohuacans, Huextlas and others had large round arches and deep vaults. The average width was 6 cm. 5 mm. The tribes of Chihuahua generally averaged smaller—5 cm. 5 mm.—very few being above 6 cm. The form of the arch was generally round, with many round V-shaped. The vault was usually deep, a very few being low. The surprising thing was the number of round V-shaped arches, meaning those, of course, not deformed but apparently nor-

mal. A few large square arches were observed, especially from Casa-Grande.

The Teeth of the Mexican tribes examined of course presented great variations, and had a few conspicuous characters that are of special interest. The one remarkable ethnic-dental feature of the Mexicans is the excessive smallness of the bicuspids. This was noted to a degree among the Peruvians (op. cit.), but with the Mexicans it was extraordinary—so much so as to be a positive ethnic feature. Whether this peculiar feature will be found to prevail among other tribes than these here observed will remain for future investigations to decide, but as there is a general racial connection of all the tribes of Mexico this feature will probably be found general. Other features of minor importance but of special interest were found, which will be noted in the detailed descriptions.

As regards diseases, abnormalities, malpositions, etc., there was the usual amount that we have become accustomed to expect among peoples who are not essentially primitive. The civilization of the Mexicans, such as it was, induced some kind of enervating life and consequent degeneracy of structure that had its effect upon the teeth. There was marked malposition of the teeth in many cases, so much so as to cause surprise. Not many jaws were much contracted, but a few were saddle-shaped, and a few V-shaped from crowding and malposition of the teeth. Caries, abscess and calculus were not uncommon. Owing to the prevalence of syphilis there was much to be observed of its effects upon the bones, although no notched teeth came under my observation. Destructive abrasion was not so common as with the Peruvian skulls, so that the general effects of wear were not so marked. As the diet of the people was necessarily coarse this is rather surprising. Taken altogether, I found the effects of degeneracy in a marked degree as reflected in the jaws and teeth. The absence of one of the upper centrals was a feature in some of the skulls, and curiously enough this was also observed frequently on the streets of Mexico City in all classes. A practitioner assured me that it was due to an obstinate disease of the gums, of deeper origin than pyorrhea. The coincidence of the loss of the central incisor in both the ancient skulls and their living descendants was quite impressive.

The upper central incisors of the people of the City of Mexico

and the valley presented some interesting features. The National Museum of Mexico had, in addition to the skulls, many hundreds of loose teeth of the Tlatelolcos, which gave a complete representation of the dental peculiarities of these people. The upper centrals among them had the main feature of a wide face for the lower half of the crown, the upper half converging to a narrow neck, with a deep fossa on the lingual face with high ridges (Fig. 1). Some few had long crowns with wide neck and round face. Ridges on the labial face were very rare, this being a low and simian type. A rare form was a long crown, wide to the neck, with enamel extending

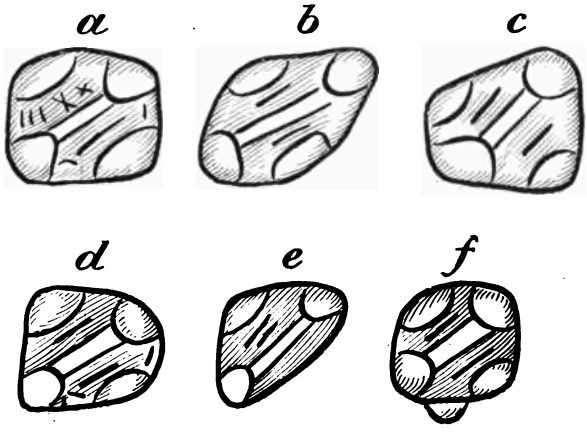


FIG. 7.

First upper molar—occlusal face. *a*. Usual square, normal form. *b*. Diamond form, paracone and hypocone reduced. *c*. Trapezoidal form, paracone and protocone reduced. *d*. Trapezoidal form, metacone and hypocone reduced. *e*. Triangular form, hypocone entirely absent. *f*. Fifth cusp, hypoconule, added to protocone lobe.

high up on the neck, and the labial ridges well marked. This type must have been intrusive, for it is of decidedly savage and primitive relationship. There was but little variation among the Tlatelolcos from the main type of the wide lower half of the crown, narrow neck and deep lingual fossa. The roots were usually long, some of them having great length. Very short "stubby" roots were rare—such as are often found with extra large, wide crowns. There was not as much wear of the incisors as is usual with such races as the Indians. The Mexican valley tribes presented much the same type.

Among the Tarascans the prevailing type of the centrals was

tematically reduced, although the metacone was not diminished so frequently as in the first. As is usual in the second molar, the reducing force was mainly centered on the hypocone. The protocone was nearly always full over the entire lingual face. The diamond form occurred, but from the reduction of the hypocone and paracone, and not of the opposite cones, as usually takes place in the first molars. The deformed, compressed diamond occurred also. The roots were usually fused to the connate form, especially when the crown was reduced, but were divergent like the first when the crown was square. In fact, all the varieties of the second molar that are so well known among Europeans occurred with quite as much frequency among the Tlatelolcos. In those from St. Simon and the Mexican valley the tricuspid and trapezoid forms occurred with most frequency. The square form was rare.

Among the Tarascans it was in general of tricuspid form, with the hypocone much reduced or absent. The trapezoid form came next. A diamond form with the paracone much enlarged was found. The metacone was reduced with unusual frequency for this tooth. The crown was rarely square, with all the features of the first, including the slight reduction of the metacone. A large tricuspid form was a variety in which the hypocone was absent and the entire trigon enlarged. A very few cingules on the protocone were found, which is unusual in the second molar. The prevalence of the tricuspid form with the trigon (the three primitive cones) alone preserved was remarkable. A larger percentage could not be found even in the Latin races of Europe, who present this lemurine feature so constantly. Among those from Tabasco there was about the same proportion of tricuspid second molars, with the hypocone absent, and of the trapezoid form, with the hypocone and metacone reduced, as with the Tlatelolcos. There were not perhaps so many of the full square form. A rarity was an enlarged metacone. The Otomies and others were about the same. Among those from Xico there was an unusual proportion of diamond and oval shapes. Those from Teotohuacan, Zapotec, etc., had the same proportion of tricuspid and trapezoid forms. Among the miscellaneous tribes of Chihuahua the tricuspid type prevailed, with some trapezoid and a very few large and square crowns.

The tricuspid form of the second molar was thus most prominent among the tribes of Mexicans examined, and this tooth presented

more deformity than among an equal number of Europeans, unless it should be those of the Latin race. Prof. Cope some years ago called attention to the lemurine tricuspid form of the upper molars of the Latin races.

The lower first molars were usually large and square, for it is the one member of the entire human series that is most constant and exhibits the fewest signs of degeneracy or reversion. It usually had the five cones and cusps well developed and the crown flaring, i. e., wider at the marginal ridges than at the neck. As this tooth maintains the purity of its primitive type, there were a few of the extreme simian form in which the crown was elongated distally. The absence of the fifth tubercle was unknown among those examined, and the only variability it presented was its position, as to whether it was on the buccal line or was moved back onto the distal marginal ridge. This slight change modified the shape of the crown somewhat, and there was some variation also as to the size of the triangular ridges of the cusps and the consequent extent of the occlusal fossa. As a rule this was wide and well marked, as the cusps and tubercles of the teeth were unusually low and undeveloped in all of the teeth of the Mexicans. The only irregularity that occurred was the division of the metacone (mesiolingual cusp) by a groove into two points, making a six-cusped tooth. This can hardly be considered as normal, however. The roots were generally normal as the crowns were usually so. Taken altogether, the first lower molar among the Mexicans was a well developed and functional tooth.

Among the Aztecs and Mexican valley tribes this tooth was usually large, square and flaring. Among the Tlatelolcos it was also large and flaring with large fossa, but there were also some small crowns. A few divided roots were observed, which is not an unusual reversion in this tooth. A few with wrinkled occlusal faces were found among the Tlatelolcos and Aztecs. Among the Tarascans it was large and medium and square, with all the features perfect to a degree. Quite a number flared at the back especially, which would indicate an unusual retention of simian perfection. The wide fossa prevailed and a few were wrinkled. In those from Jalisco it ranged very large, with all the features well marked, and flaring distal borders. Those from Xico, Teotohuacan, Zapotec, etc., were much the same—large, square and perfect as to detail. From

the tribes of Chihuahua they ranged from large to medium, with the details well developed.

The second lower molar was quite in contrast to the first, for it presented as many of the signs of degeneracy as are common to this tooth among Europeans and other higher races (as I have noted elsewhere—see Trans. Internat. Dental Congress, Paris, 1900—Fig. 9). Among the Mexicans it was quite degenerate, showing generally the quadrituberculate form, with only an occasional reversion to the five-cusped type of perfection, which is simian. The form of the crown depended upon the number of cusps or cones, i. e., with the five-cusped form it was flaring like the first, and with four it was more cylindrical.

Among the Aztecs and Tlatelolcos it ranged from small to medium in size, with quite a number of large ones with five tubercles. The roots were connate in the four-cusped type and divergent in the five, which was like the first molar, of course. The cusps were generally well developed, with large triangular ridges, and the wide fossa only in the five-cusped type. In the Mexican valley there was more of a prevalence of the four-cusped type with medium crown. Among the Tarascans there was a much larger percentage of the five-cusped crown, although the quadritubercular predominated. The tooth was apparently not of as degenerate organization as with the other tribes examined. An unusual number were of the primitive quinquitubercular type, with the distal projection and very wide fossa. Some were wrinkled. All these signs of perfection of this tooth would imply a more primitive organization for the Tarascans. Those from Jalisco exhibited a less proportion of the fifth tubercle and more of the quadritubercular form. In those from Xico, Teotohuacan, etc., there was a less proportion of the fifth tubercle. In the Chihuahua there were more of the four tubercles.

Taken altogether, the second lower molar was very variable among the Mexicans—almost the same, except the Tarascans, as it is found among Europeans, who also differ as to the tribes and nations of Europe.

The third molars were very degenerate—quite as much so as with Europeans—and the same types of variety and eccentricity of form were found among the Mexicans. A few normal crowns were observed in which the types of the preceding molars in the same jaw

were reproduced, but these were in the great minority. The majority were reduced, malformed or absent.

The upper third molars were as usual more reduced than the lowers. This is common among Europeans. The tricuspid and bicuspid forms were frequent. Various irregular trapezoidal forms were found, as also the mere peg-shaped. Total suppression was common, and encapsulation in the bone not infrequent. Among the Aztecs and Tlatelolcos this tooth was very much reduced, with all varieties of the trapezoid, tricuspid and bicuspid crowns—the last two predominating. There were but one or two full-type upper molars found among them. Such a record of degeneracy surpasses even the Europeans. As a consequence the roots were connate, and none divergent except in the full crowns. A very few were wrinkled. Many were not erupted, but whether totally suppressed or not could not be made out. Fourth molars were fused to a few, as in some diamond shapes, or in buccally distended crowns with supernumerary cusps.

In the Mexican valley tribes these teeth were usually small and tricuspid. Some were bicuspid, and rarely were they of full type. Among the Tarascans there were a very few of full type like the first molar. There were many of tricuspid form, with some bicuspid and trapezoid with four small cusps. Quite a number were wrinkled, with partial obliteration of the cusp pattern. Some were suppressed or perhaps only contained in the jaw. From Jalisco they were small and tricuspid or trapezoidal, with an unusual proportion unerupted. From Xico, Teotohuacan, Zapotec, etc., they were tricuspid, trapezoid and wrinkled. The miscellaneous tribes of Chihuahua were mainly trapezoid, with some wrinkled and bicuspid.

The lower third molars were not quite so reduced as the uppers and not so erratic as to form. They frequently reproduced the quinquicuspid lower molar type, but the majority were four-cusped like the second, or with four or five cusps irregularly arranged. Quite a number were of the wrinkled, orang type, not infrequent in lower third molars. Some few had the extra number of cusps indicating the addition of supernumerary or fourth molars. There was as much irregularity of eruption, impaction, deflection outwards, etc., as with Europeans.

Among the Aztecs and Tlatelolcos the full five-cusped form was not uncommon, although the four-cusped or four or five irregular forms were in the majority. The crowns were usually full and not so deficient as were the uppers. A few were wrinkled. The roots were of the same irregular form, connate and turned backward as a rule. In the Mexican valley they were of much the same type. Among the Tarascans this tooth varied from full type to four cusps or wrinkled, being unusually well developed. There were a large number of full size. The four and five cusped were often irregular in outline. There were a number of impactions and displacements toward the cheek. Those from Jalisco, Xico, etc., were about in the same proportion. There were a number of wrinkled crowns among the latter. The other tribes were about the same—some full type but more often irregular four or five cusps.

The third molars of the Mexicans thus exhibit a degree of degeneracy that is surprising, when we consider the scale of their cultural elevation. The frequency of degeneracy is quite as great as among a similar number of Europeans.

In conclusion, I will not attempt to draw any deductions from the data herewith presented, except such as have been incidentally made in the course of the paper. The data are insufficient from which to make generalizations. The most that I can claim is to hope that these studies may incite others who may have opportunity to make further observations, to the end that in time a scientific odontography of this most interesting group of people may be made out. In this, as in others of my investigations of the subject of ethnographic odontography, I am but blazing the way for future scientific work.

SECTION V. - Continued.

Evolution of Teeth.

PAPER BY C. N. PEIRCE, OF THE SECTION.

That human dentition, in common with that of other mammals, has been evolved from a simple and homogeneous type to a more complex and heterogeneous one, both as regards structure and form, is no more a questionable problem. In this modification of tissue from the simple to the complex, and the arrangement consistent with function, we must place nutrition and the dietetic habit as important factors.

To consider intelligently the peculiarities of mammalian teeth we must not ignore the primitive mammalian dentition, nor can we neglect our knowledge of the teeth of the mammalian ancestry from which we must closely follow and note the evolutionary changes.

If in our choice we are, as has been suggested, limited to the batrachia and reptilia as mammalian progenitors, then to these animals must we look for our most simple and primitive tooth forms. In referring to these we find them consisting of cone-shaped anchylosed crowns, the number large and variable and the succession almost endless.

Accepting the "dermal denticle" as the immature condition from which all teeth were primarily derived, we have these teeth of the batrachia and reptilia as a step in advance. In certain of the reptilia an evolutionary progress is made, resulting in the implantation of the teeth in distinct sockets, with the addition of a cingulum or an abortive cusp on the crown, and a tendency to bifurcation of the roots by flattening and longitudinal grooving.

From these primitive forms, with numbers, shape and durability so variable, there is much room for modification before we reach the incisors of the rodentia, the sectorial tooth of the carnivora, and

the broad, grinding molars of the herbivora, or the comparatively fixed, though less specialized, teeth of man. The uncertainty in the number and in the succession of the teeth of the reptilia, as compared with the two definite sets of the higher mammals, has led to much conjecture regarding the origin of this fixedness, and to an effort to determine whether the deciduous or the permanent set is entitled to the credit of priority in its evolution; also in those mammals which have but one set, whether it is the permanent or the deciduous which has been lost.

In making this mention of the relationship between the permanent and deciduous set one may very pertinently ask: Are the deciduous teeth superadded embryonic structures which subserve a temporary purpose and disappear with approaching maturity, or are they to be homologized with the first set of teeth of the lower vertebrates? The rudimentary condition of the deciduous teeth in some mammals is given as evidence of their transitional character, and if it is true that tissues most recently developed are frequently the first to be atrophied, it would appear that these are superadded structures, but we must not overlook the fact that the enamel organs of these deciduous teeth arise de novo from the lining membrane of the oral cavity, and that in their evolutionary stage of development, by a process of budding, the enamel organs of their permanent successors arise from the necks of the enamel organs of the deciduous teeth. Another fact in this connection must be mentioned, namely, that the germs of the first permanent molars, by their origin, stand physiologically in the same position as the more anterior deciduous teeth, and that the germs of the second permanent molars arise from those of the first, and the third from the second, just as do the germs of the permanent anterior teeth from the enamel organs of their predecessors. In noting the origin of the first permanent molar it must not be forgotten that all of its associations point distinctly to its being a persistent milk molar.

Minute Anatomy.—Having thus spoken of tooth origin or evolution, I wish to devote a little time minutely to tooth development. The incipient appearance of the tooth is at a time when the mucous membrane covering the jaw is embryonal or gelatinous tissue, when it is a network of branched embryonal cells—a prolongation, as it were, of the epithelium of the surface penetrating the mucous membrane. This prolongation, much thickened at its subjacent end, is

the primary enamel organ. This organ at its deep end becomes invaginated by a mass of gelatinous papillary tissue, which constitutes the tooth papilla and which is entirely derived from the mucous membrane. This primary enamel organ is in this manner converted into the true enamel cap which will be the covering of the embryonal tooth papilla.

The gelatinous mucous membrane which immediately surrounds this rudimentary tooth represents the tooth sac. This vascular membrane at first consisting of a network of embryonal cells is soon filled with bundles of fine fibrils, these are grouped into a laminated structure and form a sort of meshwork with one another and complete the tooth sac, which is well defined from the mucous covering.

The connection between the enamel organ and the surface epithelium, owing to the growth of the mucous membrane over the former, is severed at a somewhat later stage.

This vascular papilla, which is covered by the enamel cap, is composed of a network of nucleated cells which gives origin to the pulp, and through it odontoblasts produce the dentin. The odontoblasts make their appearance early as a stratum of large and more or less columnar cells. These elongate at their distal extremity just previous to the formation of the matrix of dentin. Then the pertinent inquiry is as to the odontoblasts themselves being calcified, or is the dentin matrix an excretion of these elongated cells? It is well recognized that the growth of these cells continues as long as the dentin increases in thickness, and that the most recently formed dentin remains for a limited time uncalcified. This being the case it is easily distinguished from a well-marked boundary line of the older and previously calcified dentin.

There is to-day a seeming uncertainty in the minds of histologists as to the complete disposition of the odontoblastic cells, what part is responsible for the matrix of dentin and what part, if any, persists as the dentinal fiber. It is certainly fair to assume that the odontoblasts proper yield the dentinal matrix, while the dentinal fibers are derived from a deeper, or, at least, an additional layer of processes or projections of the cells. Thus, while the continued growth of the outer extremity of the odontoblasts yields new layers of dentinal matrix, that of the processes of the deeper layer of cells causes the elongation of the dentinal fibers, and enables these to keep pace with the growth of the matrix of dentin.

In the growth of the tooth sac over the enamel cap its connection with the surface epithelium becomes gradually severed. The enamel cap, however, is limited both on its inner and outer surface by Huxley's membrana propria.

The next change that takes place in the enamel cap is a separation into an inner and outer membrane by some flattened cells forming a middle membrane in which no vessels are present. The inner membrane, so called, is in contact with the dentin, or if this is not formed, with the tooth papilla. These cells embracing the inner and outer layer are called by Kolliker the enamel cells and consist of a dense reticulum. Outside of these enamel cells are layers of small cells with a spherical nucleus, which form the stratum intermedium of Hanover.

The outer membrane of the enamel cap is composed of several layers of epithelial cells, but as development progresses the middle membrane gradually disappears and the inner and outer membranes are brought in contact and constitute the enamel cap. The enamel is now formed from the inner side of this membrane in the same manner as the dentin is formed from the odontoblasts; that is, the extremity of the cells next to the dentin elongates and is directly converted into enamel, or else the enamel is formed as an excretion from this tissue. Waldeyer and Tomes think there is a direct conversion of the tissue into enamel, while Kolliker, Kollman and Huxley think it is an excretion from the enamel cap tissue. The increment or increase of the enamel cells and the conversion into enamel probably occur successively, hence we have the transverse markings of the enamel prisms thus explained. The enamel cells, like all epithelial cells, being separated by a homogeneous substance, it is evident that the remains of this material must be found between the enamel prisms, but in quantity gradually growing less in the fully formed tooth. This interstitial substance is recognized in a degenerating or disintegrating tooth with a tendency to facilitate its disorganization.

In the examination of recently formed enamel we have the appearance of closely packed hexagonal prisms seen endwise, which show an opaque peripheral and a clear central part. This condition is due to the periphery first solidifying while the center for a time remains semigelatinous and transparent. The cells that remain on the outer surface of the enamel give origin to the cuticle found on

the surface of enamel. The membrana propria of Huxley, to which we have previously referred as the border line between the enamel and dentin, in fully formed teeth entirely disappears. The tissue of the tooth sac, from which we have the cuticle of the enamel developed, extends down the tooth towards the apical extremity and represents the matrix from which the cement is formed; in both structure and function it is an osteogenetic layer and produces tissue in its activity almost identical with bone.

SECTION V.—Continued.

Certain Abnormal Oral Manifestations Peculiar to Tropical and Subtropical Climates, as Manifested Among the American Troops in the Philippine Islands.

PAPER BY JOHN S. MARSHALL, OF THE SECTION.

My object in preparing this paper is to fulfill a promise which I made to this Association two years ago, namely, to present to you at some future time such matters of general interest as might come under my observation in relation to such abnormal oral manifestations and diseases as are prevalent among our troops in the Philippine Islands. During the last two years I have been stationed at the U. S. Army General Hospital, Presidio, San Francisco, where my opportunities have been exceptionally good for observing the effects of a tropical residence upon the general health of our troops, and particularly its effects upon the teeth and oral tissues. The Presidio is the great receiving station for troops going to and returning from the Philippine Islands. The permanent garrison is large, and the General Hospital the largest of the U. S. Army. The number of sick in the General Hospital varies from five to seven hundred; troops in permanent station between three and four thousand; recruits and casuals, an indefinite number, ranging from three hundred to a thousand or more. The opportunity has therefore been good for making such observations as form the subjects of this paper.

Dental Caries.—Dental caries is generally conceded to be the most common disease with which the human family is afflicted. In the selection of young men for military service in the United States Army physical perfection, or as near thereto as is practicable, is a prerequisite, and it is supposed that the teeth are in good condition when the recruit is accepted and mustered into the service. This, however, is far from being the fact, and can hardly be expected

when statistics upon the prevalence of dental caries among American school children show that between thirty and forty per cent have decayed teeth, while the ratio is much higher in those who have reached the legal age for enlistment. In an examination of more than 7,000 officers and enlisted men I have found but one, a young officer, who was free from dental caries. The Army requirements for enlistment in reference to the teeth are that the recruit "shall possess at least two opposing molars upon each side of the mouth." This requirement the recruiting officers and examining surgeons rigidly enforce, but my observation of the recruits sent to this station has shown that in many cases these opposing molars are badly decayed, having exposed pulps, or are the seat of dento-alveolar abscess in its various stages; while some of the teeth are so badly diseased that extraction is the only remedy. This badly cripples the masticatory apparatus and renders it impossible for these men to properly triturate their food. Under these circumstances it would seem exceedingly doubtful whether such soldiers could maintain their health under the trying conditions of a long campaign in the tropics. These matters were at once called to the attention of the Surgeon General, with the result that greater vigilance has been exercised on the part of the examining surgeons in the examination of the teeth.

There is a general impression abroad that dental caries and other oral diseases present more active or acute symptoms among Europeans or Americans after a more or less prolonged residence in tropical and subtropical climates. This impression is undoubtedly correct, for it has been noticed among our troops resident in the Philippine Islands that a few months after their arrival they begin to complain of oral diseases, while dental caries in particular, and those diseases which are incident to the progress of this affection, such as pulpitis and dento-alveolar abscess, are very common. However, whether this is due to neglect of a proper hygienic care of the teeth during the privations of active campaigning, or to the depressing effects of a tropical climate upon assimilation and vital resistance (thus inducing a perversion of the oral secretions and greater susceptibility to dental disease), or to the necessary changes in the character of the food, remains to be demonstrated. It would seem more than probable, however, that it is due to the effects of all of these conditions combined.

General Miles, in his report to the Secretary of War on his recent visit of inspection to the Philippine Islands, says: "The effect of the climate is a most serious detriment to the service. The men go there in perfect health and in the prime of manhood, but as a body are seriously affected in the course of two or three years' service. Very few escape, and the majority are debilitated. The effect of the climate upon the families of officers and soldiers is more perceptible. They being the weaker element quickly become a prey to the injurious effects. Many of the officers have been obliged to send their families home, or to a northern climate, like Japan, to recuperate. * * * * * As the military stations with few exceptions are very remote, and the troops are required to be in communities that are neither beneficial nor congenial to them, the service is very depressing, and to some extent has a demoralizing effect. There are scarcely any amusements or recreations for the soldiers, and life under such conditions becomes very monotonous. During my visits to the garrisons it so happened that I did not see a single soldier under the influence of liquor. I visited the hospitals and the guard houses, and in the former I did not find a single case of alcoholism, while in the latter there were but very few men under the charge of drunkenness. While the list of sick is very large, the number of men in confinement was exceedingly small, at some posts and camps not a single soldier being in the guard house. * * * * * While this statement shows a serious condition as to the health of the commands, it is a most favorable report as to sobriety."

The report of the Surgeon General, for the fiscal year ending June 30, 1903, will show that the dental surgeons of the army have operated upon 16,161 officers, enlisted men, nurses and general military prisoners, and that they have treated 45,008 cases of dental and oral diseases, principally dental caries and its sequelæ, and performed 49,483 operations. It will also show that these diseases are very prevalent among our troops, as twenty per cent of the entire army have applied for treatment. There is not a doubt in my mind that if a systematic examination of the teeth of the entire army could be instituted the percentage of those afflicted with dental diseases would be far in excess of these figures.

This report will also show that dental diseases are 18.27 per cent more frequent among our troops in the Philippine Islands than

they are in the troops stationed in the United States; while with the troops stationed in Cuba and Porto Rico these diseases are still more prevalent, the per cent being 21.17 higher, or 2.90 higher than for the troops in the Philippines. This higher per cent for the troops in Cuba and Porto Rico is explained by the fact that among the native Porto Rican troops dental caries and kindred diseases are much more prevalent than among the white troops who were stationed in Cuba.

The following table will show the mean strength of the army during the year 1902, with the number of cases of dental and oral diseases treated by the army dental surgeons in the United States, Philippine Islands, Cuba and Porto Rico, the per cent of cases treated in each of these countries, based upon the mean strength of the troops stationed there, and the total per cent of cases treated for the entire army:

TOTAL DISEASES AND INJURIES TREATED.

	U. S.	Philippine Islands.	Cuba and Porto Rico.	Total.
Mean strength of troops for year 1902.....	39,737	37,768	3,274	80,778
Total of all diseases and injuries treated.....	16,826	26,085	2,097	45,008
Percentage to mean strength.....	42.85%	61.12%	64.02%	55.72%

TOTAL OPERATIONS PERFORMED.

	U. S.	Philippine Islands.	Cuba and Porto Rico.	Total.
Total of all operations performed.....	18,971	28,115	2 397	49,483
Percentage to mean strength.....	47.74%	74.44%	73.37%	61.26%

Pyorrhea Alveolaris.—Another oral disease which is very prevalent among our troops in the Philippine Islands is pyorrhea alveolaris. The forms of the disease which are most common are ptyalogenic calcic pericementitis and phagadenic pericementitis. The first is most often found in the men who are in good health, but who pay little attention to oral hygiene, and many of them claim that they had no trouble with their gums or with the accumulation of salivary calculus upon their teeth until after several months' residence in the Islands. This fact is borne out by the statement of several officers who have always been careful in the matter of oral hygiene, but who have found that a residence in the tropics seemingly induced inflammation of the gums and a greater and more rapid deposit of salivary calculus. This condition, I am inclined to believe, is due to the active, strenuous life which they have led in the field, and the hardships endured while campaigning

in a strange country, under harassing conditions, surrounded by a treacherous enemy, and without roads, telegraphs or suitable transportation. Such a strenuous life of course leads to greater activity in the metabolic processes of waste and repair in the tissues of the body, and under such conditions the calcic carbonates and phosphates are augmented in the saliva as well as in the urine, and the amount of ammonia thrown off by the lungs is also increased, thus favoring an increase in the deposition of salivary calculus upon the teeth. The rapid formation of salivary calculus is indicative of a disturbance in the equilibrium of the metabolic process of tissue waste and repair, or in other words, constructive or synthetic metabolism is not keeping pace with that of the destructive process. The inflammation of the gums which always precedes the deposition of the calcic salts in these cases is also another evidence of disturbed nutrition and lowered vitality.

The hematogenic or gouty form of the disease is rarely seen among our troops who have served in the Philippines, except in a few of the older members of the service who were suffering from the disease when they went out. Warm climates are not conducive to the production of gouty and rheumatic affections, by reason of the more free elimination of the waste products of tissue metabolism through the skin and other avenues of excretion.

Phagadenic pericementitis is very prevalent among those officers and men who have suffered from anemia, typhoid fever, tropical fever, tuberculosis, nephritis, alcoholism, diabetes mellitus, albuminuria and sexual diseases. The etiology of this form of the affection is very obscure indeed. About all we know of it is that it is usually associated with some debilitated condition of the system induced by overwork, debauchery, severe and prolonged illness, or by the exhibition of certain drugs which have a selective action upon the tissues of the mouth.

The disease as it appears in most of the cases that have come under my observation has been of an acute or subacute variety, the teeth having been lost in a few months after they were attacked. I have seen several cases in which all the teeth were lost by the disease in less than two years. These are the cases that are sometimes classed as scurvy in the reports of "Sick and Wounded," and for which soldiers are entitled, under the decisions of the Pension Office, to draw a pension.

Inflammatory and Ulcerative Conditions of the Oral Mucous Membrane.—Inflammatory and ulcerative conditions of the gums and mucous membrane—stomatitis simplex and stomatitis ulcerosa—are very prevalent among the soldiers who have recently returned from their tour in the Islands. Some of these cases are due to the accumulations of salivary deposits and food debris, in other words, to a bad hygienic condition of the mouth. In other cases, those in which the teeth and mouth are in a fairly clean condition, the inflammation and ulceration seem to be due to a lowered vitality of the general system. It has also been found, in many of the cases of chronic diarrhea and dysentery that have been invalided home and placed in the General Hospital, that ulcerative conditions of the gums and oral mucous membrane are very prevalent. These cases of intestinal disease often make exceedingly slow progress towards convalescence, some of them remaining in the hospital month after month with little permanent improvement.

In a conversation with Colonel A. C. Girard, who was at that time in command of the hospital, I suggested that there might be some important relationship existing between the chronicity of the disease and the unhygienic condition of the mouth, and that it was not improbable that in some of these cases the unclean condition of the oral cavity was a source of secondary infection. He therefore issued an order directing that all obstinate cases of these diseases be sent to me for examination and treatment of any abnormal oral conditions that might be present. In some of the most obstinate cases I found the mouth and teeth in a very unclean condition, the gums inflamed and turgid, the oral mucous membrane inflamed, and in some of the worst cases the mucous follicles were enlarged, forming vesicles which later ruptured, leaving small ulcerated patches, which in the course of twenty-four hours were covered with a curdy white pellicle. These ulcerative patches were exceedingly sensitive to acids and pungent foods or liquors.

The treatment adopted was as follows: After a thorough removal of the salivary deposits found upon the teeth, spraying the mouth with a twenty-five per cent solution of hydrozone, and painting the gums and ulcerated patches with the following:

℞ Tinct. Iodin.....20 c.c.
Tinct. Aconite.....aa

the patient was dismissed with instructions to report for treatment

the next day. He was also furnished with a twenty-five per cent solution of hydrozone, and instructed to rinse the mouth with it on rising in the morning, after meals, and before retiring. The daily treatment consisted of spraying the mouth with twenty-five per cent solution of hydrozone, painting the gums with the iodin and aconite mixture, and touching the ulcerated patches with a ten per cent solution of silver nitrate. This treatment followed for a week or ten days usually cured the mouth symptoms, and almost immediately thereafter the general condition of the patient began to improve, and many after a few weeks more were discharged as convalescent.

This I think proves the fact that in those cases in which rapid improvement in the general condition of the patient followed the cleansing of the teeth and the treatment of the mouth, the chronicity of the disease was due to constant reinfection from the unhygienic condition of the oral cavity. The removal of the salivary deposits and a few days' treatment with antiseptic mouth lotions in the uncomplicated cases always resulted in a speedy cure of the oral symptoms.

Sprue or Psylosis.—Another form of sore mouth, found associated with a chronic catarrhal inflammation of the alimentary tract, with dyspeptic and diarrhetic symptoms, and known in the tropics as "sprue," "psylosis," or "tropical diarrhea," is common among our soldiers in the Philippines. "Sprue" is a peculiar and very dangerous form of catarrhal inflammation involving the whole or a part of the alimentary mucous membrane, chronic in character, and subject to frequent exacerbations of greater or less severity. It is usually associated with a torpid condition of the liver and a suppression of the glandular activity of the mucous membrane of the stomach and intestines, or perversion of the secretions which perform gastric and intestinal digestion. It is a disease peculiar to tropical and subtropical climates, and is more frequently seen among European and American residents than among the native population. Our American soldiers are seemingly very susceptible to the disease, as many cases are reported occurring among them, and a considerable number have been invalided home with the hope thereby of establishing a cure. Many of the latter cases have come under my personal observation, the clinical aspects of which have been studied with increasing interest. The disease is undoubtedly of myotic origin, but

no specific microorganism has yet been found which can be positively demonstrated as the cause of the affection.

The predisposing causes are prolonged residence in the debilitating conditions of a tropical or subtropical climate, and such exhausting diseases of the alimentary tract as diarrhea and dysentery. It is not infrequently associated in the female with frequent childbearing, miscarriages, uterine hemorrhages and prolonged lactation. It may also be superinduced by syphilis, by prolonged exhibition of mercury, potassium iodid, alcoholism, overwork, mental strain or anxiety, or "any depressing influence, particularly if it is combined with gastric or intestinal irritation."

Susceptibility to the disease is greater in some individuals than in others, the mental condition seemingly having a marked influence in this direction. It has been noticed that many of the soldiers of our Army who have been attacked with the disease had previously suffered from mental depression due to homesickness or other causes. In some of these cases the disease has developed after a few months' residence in the Islands, while in others not until a residence of one or two years or more. Sometimes the disease does not come until the patient has been home for several months, and in most of this class of cases it develops as a complication of chronic diarrhea or dysentery.

Symptoms.—The general symptoms are soreness of the mouth, painful deglutition, tenderness over the stomach, dyspeptic distension of the abdomen, and frequent diarrheal discharges in the early part of the day, great physical weakness and emaciation, loss of memory, and irritability of temper. The disease is remarkable for its variability in the severity and combination of its symptoms, and in the rate of its progress. In some cases it takes on a subacute form, terminating fatally after a year or two of suffering, while in others, according to Manson, it may drag on intermittently for ten or fifteen years. The prognosis is good in recent cases when proper and prompt treatment is employed and the patient is judicious in his diet, while it is unfavorable in the chronic cases of long standing or in patients in the decline of life.

Oral Manifestations.—The mouth upon examination will present a variety of superficial lesions of the mucous membrane, which vary in their character according to the severity of the gastric and intestinal symptoms. When these symptoms are most pronounced

the tongue will have an angry red appearance, with minute vesicles, patches of congestion and superficial erosions upon its edges and tip. Deep fissures sometimes appear on the dorsum, due to the swelling of the mucous membrane, while the under side of the organ, upon either side of the frenum, will present patches of superficial ulceration, sometimes red, at others covered with a white or bluish-white pellicle, having the appearance of aphthous patches. Similar patches and superficial ulcerations are found upon the mucous surfaces of the lips and cheeks and occasionally upon the palate. Vesicles are sometimes found upon the palate and buccal mucous membrane which rupture and form ulcerated patches, and in the more severe cases the uvula and fauces are red and excoriated, thus making it difficult for the individual to swallow, while the soreness and tenderness of the mouth excites an excessive flow of saliva which, on account of the difficulty experienced in deglutition, dribbles from the mouth. Food is taken with difficulty, while pungent or highly-seasoned foods, wines and liquors, cause pain and a burning sensation of the mouth and tongue, and in some cases pain and the burning sensation are experienced in the esophagus as food or liquids pass from the mouth to the stomach, which is evidently due to the inflamed condition of the mucous membrane of this passage.

The oral symptoms are of such a character that to my mind they point very strongly to a myotic origin, as the white or aphthous patches appear to be composed of masses of the thrush fungus or Oidium Albicans.

In all cases of sprue the oral cavity is invariably in a very unclean condition, the teeth are covered with salivary deposits, food debris and inspissated mucus, the gums are more or less inflamed and swollen, tender to the touch, and bleed upon the least provocation, and the breath and saliva are of a disagreeably fetid odor. In fact, the whole condition is such that it suggests the possibility and even the probability that the chronicity if not the origin of the disease is due largely to this neglected and filthy condition of the mouth.

The menace to the general health through an unclean mouth and diseased teeth is by no means even approximately appreciated either by the medical and dental professions or the laity, as is evidenced by the fact that very few physicians take into account the influence

of diseases of the mouth and teeth upon the general health when examining a patient for some obscure disease of the general system. The oculist, aurist and laryngologist generally appreciate the value of an oral examination in trying to arrive at a correct diagnosis of certain diseases affecting the organs of their special field of practice, but the general practitioner is often ignorant of its value or careless in its employment. Many cases of what have appeared to be due to malarial influences or bad plumbing have been traced to an unclean or diseased condition of the teeth and mouth, while numerous other cases of gastric and intestinal affections have been traced to the same source.

It is a well-established fact that summer diarrhea accompanied with aphthous patches (thrush, or sore mouth), which affects so many bottle-fed children in the foundling hospitals and orphanages of our large cities during the hot months of the summer, is an infectious disease, spread from child to child by the use of unclean nursing bottles, tubes and nipples, and also that by ordinary cleanliness the disease can be prevented. A dirty nursing bottle is clean, however, when compared to the mouth of a person suffering from a severe case of sprue.

With the ordinary soldiers of today a proper care of the teeth and mouth is much neglected, and although they may have been repeatedly instructed by the surgeons and the dental surgeons to keep their mouths and teeth clean, many of them never use a tooth brush or even think it necessary to rinse the mouth after meals. As a consequence the mouths of such individuals are in a very uncleanly condition, and the salivary secretions loaded with microorganisms. The same criticism may be made in relation to many otherwise cleanly persons in civil life, who never visit a dental surgeon until driven to it by severe suffering, and are then astonished when told that *clean teeth do not decay* and that *clean mouths are rarely ever affected with disease.* The task of educating the general public up to a realization of the fact that dental and oral diseases are largely due to a neglect of the simplest hygienic measures lies at the door of the general practitioner and of the dental surgeon, and if we do not teach this in season and out of season we are not performing our duty to our patients nor fulfilling our obligations to the state.

In my offices at the General Hospital I have large cards printed

with these legends upon them: "Clean teeth do not decay" and "Do not ask the dental surgeon to treat your teeth until after you have brushed them," and I have been greatly pleased with the good impression that this information and suggestion has had upon the men, for after the first or second visit there is a marked change in the appearance of their teeth. These men also spread the information among their fellows, and I can already see a marked change in the care given to the teeth by the men of the whole garrison.

Treatment. All authorities are agreed that drugs are of little value in the treatment of the general symptoms of sprue. The greatest reliance is placed upon a change of climate, by sending the patient home or transporting him to a location where the air is cool and bracing, and placing him upon a restricted diet. Most patients do best on a strictly milk diet. In those cases which cannot take milk beef juice is usually well borne by the stomach. Warm clothing and rest must be insisted upon. The local treatment recommended for the mouth has usually been that of swabbing or spraying it with solutions of cocain to allay the pain and soreness while taking food.

I have not found in the authorities consulted that any particular method has been suggested or effort made to change the oral conditions in these cases, as they have not been looked upon as etiologic factors in the disease. This to my mind is a serious mistake, as the unclean condition of the mouth renders it a most favorable soil for the propagation and multiplication of various pathogenic and saprophytic microorganisms which are constantly passing into the stomach and intestines, and cannot be otherwise than a source of continuous irritation and secondary infection.

It has not been my good fortune to see even a single case of sprue in its incipient stage, and I therefore cannot speak with certainty upon the early mouth symptoms, but I am inclined to the opinion, from my observations of the chronic cases, that the primary cause of the disease may be very closely associated with the uncleanly condition of the oral cavity, and that the chronic condition is due in a large measure to secondary infection from the mouth. The latter statement I think is proved by the fact that several of the cases of long standing which have been placed under my care for treatment of the oral symptoms have made very rapid improvement in their

general symptoms soon after a clean and healthful condition of the mouth was secured.

My line of treatment has been as follows: 1st. Thoroughly spray and wash the mouth and teeth with a twenty-five per cent aqueous solution of hydrozone. 2nd. Remove all salivary deposits and food debris from the teeth, place temporary fillings of gutta-percha or zinc oxyphosphate cement in all carious cavities, and extract suppurating roots. 3rd. Cauterize all ulcerated patches upon the tongue, lips and cheeks, with a ten to twenty-five per cent aqueous solution of silver nitrate, and paint the gums once a day with tinct. iodin and tinct. aconite, equal parts. The patient is then instructed to cleanse the mouth after each meal by washing it with a twenty-five per cent aqueous solution of hydrozone, followed by a twenty per cent solution of listerine, using a soft tooth brush, to keep the teeth free from food debris. It sometimes takes three, four, or even more sittings to accomplish a general cleansing of the mouth and teeth, as many of these patients are too weak to endure sittings of more than one-half to three-quarters of an hour in duration. After the mouth has been put in the best possible condition that the circumstances will permit the patient should receive daily supervision of his oral treatment, to see that he is faithfully following instructions, as neglect to keep the mouth and teeth clean is liable to cause a relapse.

In closing I desire to state that I firmly believe with a larger knowledge of the microorganisms that find a habitat in the unclean human mouth, and of their means of propagation, development and dissemination, we shall find that the origin of many diseases and abnormal conditions of the general system, which now appear obscure, have their source of infection in the microorganisms of the unclean mouth, and that in other cases the chronic character of these diseases and abnormal conditions is due to secondary infection from the same source.

SECTION I.

Prosthetic Dentistry, Crown and Bridgework, Metallurgy, Chemistry and Orthodontia.

A Plea for the Abandonment of Vulcanite for Base Plates.

PAPER BY R. C. BROPHY, OF THE SECTION.

I feel fortunate in having been invited to read this paper at this time, for I am unable to conceive of a more fitting place to present a theme of moment to the world of dentistry—as I hold this to be—than before the National Dental Association. The light thrown out to protect the mariner from the shoal and the rock, the beacon from whence the signal is flashed, must be placed conspicuously. From the source of greatest potentiality only can maximum power be derived. This association stands as the cynosure of the dentists of the world. The ambitious, aspiring and progressive men of our profession watch with interest the deliberations of this body, and regard them as entitled to their consideration. So I feel it is fitting that a plea for the abandonment of vulcanite for base-plates, in order that it may receive the notice and consideration which it merits through its importance, should be made before this body.

I stand to-day a radical opponent of vulcanite plates, and the views which I am about to express are radical, but though I treat this subject in the strongest language, I feel that I shall have many able supporters among the members of this body. Indeed, it seems incredible that any knowing man can entertain a sentiment in favor of or even condone the use of vulcanite as a base-plate material. Antipathy to its use is not a new thing with me, and my convictions are so deep-seated that they are immune from counter-conviction. This latter expression may not meet with popular approval, for when a man says he cannot be made to change his mind

he manifests as a rule a very unapprovable disposition, yet a man can produce sufficient substantiatory proof of the validity of his reasoning to merit credit for decidedness of conviction. It would seem that a man should be more severely criticised for lack of independence of thought and positiveness of conviction than for possessing and exercising them. A somewhat extended experience and some special investigation have brought me to my present viewpoint.

First of all, let us speak of the incompatibility of vulcanite to the mucous tissues of the mouth, when it is held in contact with them by capillary attraction. It is a well-known fact that vulcanite is an extremely poor conductor of thermal changes. That it is a physical property of this material to very slowly conduct heat is a fixed principle in mechanics, and as a natural concomitant it follows that it absorbs and retains heat to an exaggerated extent. This matter has been a subject of special investigation, and by experiments I have proven that in comparison with the metals ordinarily used for base-plates vulcanite dominates them in this property to a marked degree.

It is my belief that the property of non-conductivity of heat of vulcanite is responsible for the pathological effects produced upon the tissues, through their constant maintenance in a superheated condition. The fact that it is only where the contact of the plate to the tissues is made fixed by positive capillary attraction that the objectionable results are in evidence I regard as proof of the correctness of this theory. Further, it is this fact which leads me to admit that in those cases where the base sets loosely upon the tissues, as in lower dentures, vulcanite from a standpoint of compatibility is not so objectionable.

I make no note of the fact that vulcanite, through its coloring matter, is a poisonous substance, for I do not think that this fact is at all responsible for the deleterious effects of the material upon the human tissues.

From the standpoint of hygiene vulcanite as a base-plate material is objectionable. Even when care is taken to keep a vulcanite plate clean it will still present an obnoxious appearance when removed from the mouth, and will throw off a disagreeable odor. The odor of a vulcanite plate when taken from the mouth is in no small degree intensified by the natural odor of the material being superde-

veloped by the body heat. When worn by one of the very many who are indifferent to the care of the mouth the conditions existing both in point of seeing and smelling know scarcely a comparison for intolerability.

While plates of all kinds will of course assume a condition of uncleanliness, and will when cleanliness is not exercised become foul-smelling, it is for vulcanite and the preparations of celluloid only that these characteristics exist to a degree which adds potently to the list of reasons why they should not be used.

Vulcanite is a vegetable compound, and as such I have never been able by any law of physiological science to reconcile its use for any purpose where it is held more or less fixedly to animal mucous tissues. I do not think that science indicates anywhere an affinity between animal tissue and vegetable matter when they are brought in contact externally, nor that there can be compatibility between them. Animal tissues are most delicately sensitive to the invasion of foreign matter; extraneous matter is met with ready and positive rebellion; but few substances are tolerated by it, and most assuredly vegetable matter is not of these.

In the field of surgery proper we are taught this lesson. Where is the surgeon who would think of employing a vegetable substance for suture, or in any capacity where contact is expected to be at all enduring, or where physiological action must not be interfered with? I feel that from a scientific standpoint the dental profession is disgraced by the use of vulcanite. A profession of honorable standing as a scientific body persistently following a course of practice which has not one single scientific sanction comprehends the dental profession as it stands to-day, a servile devotee of this practice, well known and privately admitted by probably a large majority of its members as being wrong, and as reflecting more than any other one thing upon the credit of dentistry as a science. Holding to a practice which is not supported by a vestige of scientific data, which in fact is opposed to the very laws of nature which we are supposed to support, it stands us in hand, until we can right the matter, or at least make an effort to right it, to forego our claim that science and an honest effort to subserve humanity's interest guide and govern us.

There are some other phases of the use of vulcanite in dentistry which I should like to discuss at this time, but the title of my paper

confines me to a consideration of its use for making base-plates. I cannot refrain from saying, however, that in its use of pink vulcanite as an imitation of nature's color of the gums the dental profession warrants its complete and absolute ostracism from the sphere of true art. It is true art to conceal art. Does pink vulcanite do this? Is the dental profession color-blind? And what is being done by us to better this condition? Absolutely nothing. In a Happy Hooligan fashion we are going right along, using anything the manufacturers choose to give us, with scarcely a man in the profession giving a thought or raising a voice to bring about improvement.

Finally, in closing, I would again diverge from my title theme by referring to the effect which the use of vulcanite has had upon the standard of skill of our profession. Not only have the science and art of dentistry been degraded by the use of this material, but the standard of mechanical skill has been lowered by it to an extent which in its use excludes us from the skilled artisans' class. A large percentage of the vulcanite plate work is done by individuals—you note I do not say men—who are not dentists, and who even from a mechanical, to say nothing of the scientific or artistic aspect of the case, are ignorant and incompetent. Even though they were competent, as employes of the modern public dental laboratory or factory they would be unable by virtue of the adverse conditions under which they labor to do creditable work. In vulcanite work skilful manipulation has become subordinated to cheapness of production. It would appear that the idea has come to prevail that mechanical skill is not of very much importance in making this class of dentures. At any rate, to the shame and disgrace of the profession, in the face of the fact that in the making of vulcanite dentures the standard of skill exercised has been debased to a level with and even lower than that of the ordinary craftsman, no voice of alarm is heard for the general credit of dentistry as, in part, a skilled mechanical calling.

What shall we do perhaps is being mentally asked by some of my hearers. What shall we do? Let us go back fifty-two years, to the unfortunate time for dentistry when vulcanite came upon the stage as a material for dentures, and learn the lessons of that age in this work. Then we will awaken to the fact that the mineral world alone, from every physiological and hygienic, and hence every scien-

tific point of view, and from every artistic standpoint, supplies us with material perfectly adapted to our uses as dental prosthetists, and that mechanical skill in every line of our effort pertaining to the mechanical part of our work and to the subservance of the artistic is essential to the creditable and successful practice of the profession of dentistry.

Discussion. *Dr. J. Y. Crawford,* Nashville: I condemn the practice of putting vulcanite in the human mouth, and the increasing importance of dental work will eliminate it to a great extent, for the more we treat mouths with a view to saving the teeth the less need will there be for these full dentures.

Dr. George H. Wilson, Cleveland: I believe there will always be a need for prosthetic dentistry, for so long as poor people are with us the use of some cheap base is necessitated. It is true that harm is done by placing any organic substance in the mouth, but the greatest condemnation should be placed on the improper methods of manipulating the material rather than on the material itself, for if manipulated properly it is not so objectionable. It is radically wrong for the dentist to take the impression and then have the plate made by the outside man, because the latter cannot do the case justice. As a whole I am in sympathy with the views of the essayist. Many people who are to-day wearing vulcanite plates would have something better if advised by their dentists, and there are to-day better materials to use for this purpose.

Dr. S. J. Spence, Chattanooga, Tenn: A man is of little account unless his ideals are ahead of his practice, and it is pleasant to see that such is the case in this association, for while our practice may be vulcanite our ideal is metal. I think the time is not far distant when aluminum plates will displace vulcanite. They can be made almost as easily, are more durable, are better conductors of thermal changes, and unlike vulcanite, they do not contract and affect the adaptation to the surface covered.

Dr. T. W. Brophy, Chicago: We all know that the alveolar process becomes gradually absorbed after the teeth have been extracted, and that in old age it disappears and the upper jaw becomes narrow and flattened. The vulcanite plate hastens this absorption, because on account of its being a non-conductor it is not capable of carrying the changes of temperature to the tissues beneath, so we have a

rapid destruction of membrane and bone. After the plate has been in the mouth awhile it begins to move, and the resulting friction hastens the process of absorption. In people not over thirty years of age who have worn vulcanite dentures eight or ten years we find that the alveolar processes have shrunk until their surfaces are almost flat. I do not think Dr. Wilson's argument that we must provide for the poor is well founded, because even the best plate is very cheap. It costs more money to buy the boots a man wears in a year than to pay for an artificial denture, and an individual would have to be very poor indeed to be unable to pay for an aluminum plate. The dentist should advise his patients what to have and not allow them to dictate what should be used. The dentist is largely to blame for patients wearing their plates too long. There is a constant change in the alveolar processes from the time the teeth are lost until extreme old age, and the moment a plate begins to move a little the absorption becomes more rapid. I do not believe a person should wear a plate of any material, no matter how well constructed, over five years, or eight at the outside.

Dr. B. H. Teague, Aiken, S. C.: I would call attention to a plate to be used in those cases in which there is a great deal of absorption. Where the lower jaw is so shrunken that the plate of ordinary shape would not be retained, have a metal plate stamped to fit the shrunken alveolar process, and around the center of this plate have soldered, an equal distance between the lingual and buccal edges, and extending from one end of the plate to the other, a piece of 25-gauge plate, which may be from one-eighth to one-fourth inch high, according to the demands of the case. Solder it to another plate the opposite of the lower one. This is the reverse of the plate which covers the process, and in the concave surface of it may be placed the teeth attached by means of rubber. The idea is to have a decided concave surface both labially and lingually between the upper and lower plates joined by the vertical strip of gold plate, so that the tissues may hold the plate in place by folding in upon it along both sides.

Dr. J. D. Patterson, Kansas City: I am not prepared to admit the injury from a vulcanite plate properly constructed and vulcanized from one and one-half to three hours at a low temperature. Clinical experience teaches that adhesion can be more perfectly accomplished with vulcanite than with any swaged or pressed metal plate, and the denture is more comfortably worn. The whole argument against

vulcanite is that it does not allow the conduction of thermal changes to the tissues beneath it, but any injury does not come from that cause, but because of a poorly fitting plate, or on account of filth, bacteria and fermentation, and all these may be present with a metal plate. The injury may also come from pressure that prevents the tissues from performing their function. Of course where there is irritation there may be inflammation, but the argument that vulcanite causes same because of its being a nonconductor is without scientific basis that I can see. I would ask Dr. Brophy on what he bases his assertion that the oral tissues require extreme thermal changes for their well being, and I will make the proposition that extreme heat and cold are not of benefit to those tissues except in diseased conditions.

Dr. T. W. Brophy: I maintain that the tissues beneath a vulcanite plate, because of the nonconductivity of that material, are constantly being maintained in a superheated condition. This is the important point, not the question of heat or cold from the outside. We all know that vulcanite has the effect of creating a pathological condition in the tissues which it covers, and that in cases where a vulcanite plate has been worn a great length of time the mouth will immediately assume a normal condition when that plate is taken away and a metal one put in its place.

SECTION I.—Continued.

Adhesion vs. Atmospheric Pressure in the Retention of Dental Plates.

PAPER BY N. C. LEONARD, OF THE SECTION.

In an essay entitled "Some Physical Principles Applied in Dentistry," read a little more than a year ago at a meeting of the Tennessee Dental Association, I took the position that adhesion and not atmospheric pressure was responsible for the retention of dental plates, giving some of my reasons for such belief. This statement provoked such a general furore of adverse criticism in the discussion which followed, leaving me the only advocate of my side of the case, and resulting in not a single convert from the opposing side, that I considered the matter of sufficient importance to justify me in bringing it before this body for discussion.

That an error has been and is being taught as to the relative part played by different forces involved in the retention of an upper plate I am convinced, and I am confident that a careful and scientific study of the principles involved will convince even the most skeptical, and will eliminate an error that has already occupied too conspicuous a place in the literature and teaching of one of the learned professions. The question is purely one of physics, and the principles involved are facts not theories, hence our conclusions may be accurate and definite, not mere supposition or personal opinions.

Since this error is evidently the result of a misconception of the physical laws involved, or a misunderstanding of their application to the conditions present with an upper plate in place, perhaps it may be well to define some of these laws in order to get them clearly before us in making their application. Atmospheric pressure is simply the weight of the atmosphere which, owing to its peculiar physical properties, manifests itself in every direction with the same force. At sea level this pressure is about fifteen pounds to the square inch of surface, and as it is the same upon every surface of an object the

weight of the object is not affected by it excepting to the extent of the actual weight of the volume of air displaced; that is, the force being equal in all directions makes a perfect balance of pressure, which being constant is not perceptible. An unbalance may be created, however, upon lessening the pressure on one side of a body by removing a portion of the atmosphere and thus creating a partial vacuum. This unbalance is in direct proportion to the volume of air removed from a given space.

The textbook definition of adhesion is, "that form of molecular attraction which exists between unlike particles of matter brought in contact with each other." It may be stated at the outset that atmospheric pressure and adhesion are two separate and distinct forces, neither of which is in anywise dependent upon the other for the full manifestation of its power.

One of the simplest illustrations of the force of adhesion may be made with two plain glass plates. By moistening the surfaces and placing them in contact we find that it takes considerable force to pull them apart, in fact, well-fitting plates brought in close contact with a film of water between may be made to sustain a weight of from six ounces to several pounds to the square inch, the amount depending upon the degree of adaptation of the two surfaces. This is a case of simple adhesion in which atmospheric pressure does not even play a part, and I wish to say in submitting this definite proposition that there is no other in physics the solution of which is more obvious than this or more consistent with recognized physical laws. While it is true that in this experiment the atmosphere is excluded from between the glass plates, the hydrostatic pressure of the film of water between, with the air pressing on the exposed edges, has exactly the same force, and the pressure is equalized.

A prevailing idea among dentists seems to be that when the surface of a plate is well adapted in every part to the mucous surface in the mouth, pressure of the atmosphere is exhibited only on the lingual and labial surfaces, and this is the force that prevents the plate from falling. The idea is absurd and wholly inconsistent with physical principles, and until it is entirely eliminated from the mind there can be no proper understanding of the true forces concerned and the part which each plays in the retention of the plate. The hydrostatic pressure of the fluid between the plate and the mucous membrane—the fluid being acted upon by the atmosphere—exerts exactly the

same amount of force on that surface of the plate that the air exerts *directly* on the opposite side. This makes a perfect balance which can have no weight-sustaining power.

By actual experiment I have demonstrated that glass plates placed together, as just suggested, with a film of water between will sustain just as much weight in a vacuum as in the atmosphere. In this way I have held suspended six and one-half ounces to one square inch of surface in a vacuum reduced to one-eightieth of one atmosphere. According to the laws of atmospheric pressure of fifteen pounds to the square inch, one-eightieth of one atmosphere by the most perfect arrangement possible could support only three ounces, while in this experiment six and one-half ounces were supported.

Were we not familiar with the laws of atmospheric and hydrostatic pressure, these experiments alone would indicate that atmospheric pressure could not be considered a factor in sustaining the weight, since the same amount will be sustained inside a vacuum or in the open atmosphere. So far as I can see there is no foundation whatever for a rational argument on the other side of the case, and it must be admitted that in the physical arrangement just suggested atmospheric pressure may be entirely eliminated as one of the weight-sustaining forces.

In the adjustment of a simple upper plate without the so-called air chamber the physical arrangement is practically the same as in the experiment with the glass plates, with two exceptions—first, we have two irregular surfaces adapted together with a fluid between them, instead of two plain surfaces; second, that one of the surfaces is soft and elastic. The first is an advantage, since it increases the amount of surface exposed to the action of adhesion and prevents largely the tendency of the two surfaces to slide upon each other; the second precludes the possibility of securing the full force of adhesion in admitting of the force being overcome gradually by beginning at the edges. When traction is made on the plate, tending to dislodge it, the surface of the mucous membrane, by virtue of its elasticity and the adhesive force with which it clings to the plate, is slightly lifted, adhesion is overcome first at the edges of the plate, and the mucous membrane is peeled off, as it were, the air and excess of fluid following up the separation.

While the entire surface of the mucous membrane covered by the plate has more or less elasticity, we know that usually there are

certain areas which are less yielding than others to pressure, either on account of the extreme density of the underlying integument, or the close proximity of the bone to the surface. In the surface ordinarily covered by a full upper plate the hard area is that part forming the vault of the arch and corresponds to the hard palate.

Where a plate which comes in contact with the entire mucous surface is adjusted in a case of this kind we find that when pressure is made on the grinding surface of the molars or bicuspids on one side, as in masticating, the yielding tissues of that side are compressed more readily than those in the center of the arch, and we find this hard area covering the palate acting as a fulcrum, and the opposite side of the palate may be pried loose, the elastic tissues on that side slightly lifting and the adhesive force being overcome again first at the edges.

As stated before, atmospheric pressure can have no weight-sustaining power greater than its specific gravity unless there be a partial vacuum, and in order to produce a partial vacuum by lifting the plate from the surface adhesion must first be overcome in order to secure space; then there must be some way of preventing the ingress of air. Since adhesion *must* yield first at the edge of the plate, the separation must be instantly followed by the air, which has no resistance to overcome.

Granting for the sake of argument that we have a mouth in which the mucous tissues are tightly bound down to a hard and unyielding surface *only in the center* of the vault, while the membranes covering the rest of the surface possess the usual amount of elasticity, let a well-fitting plate be adjusted in this case and pressed well into place in order to secure good contact, then if traction is made on it at right angles to the surface we find again that the soft parts, by virtue of their elasticity and adhesion, are slightly lifted, and in this case adhesion must be first overcome in the center where the tissues are unyielding. The moment that adhesion is overcome at that point there will be created a partial vacuum to which the atmosphere on the opposite side of the plate and directly over the space will manifest pressure in proportion to the exhaustion of the cavity created. Since the separation of the two surfaces at this point could amount to only the fractional part of a line without breaking up the adhesion to a point where the external atmosphere would be freely admitted, and knowing that the mucous membrane has the power of absorbing

a considerable amount of air which may be easily extracted from it, we can easily see that the degree of exhaustion obtained would not secure enough force from without to make an appreciable difference in preventing the dislodgment of the plate. In reality, however, these specific conditions would seldom occur, since the hard palatal portion of the arch usually extends backward to the palatal edge of the plate, and consequently atmosphere would be freely admitted from the outside the moment the two surfaces were separated.

Again, upon pressing the distal edge of the plate firmly against the tissues, and making sufficient downward traction at the incisal region to overcome adhesion and lift the plate away from the surface, a considerable unbalance may be created in the atmospheric force that would aid very materially in preventing the complete dislodgment of the plate. Since, however, there is no tendency to dislodge the plate in its proper use by force exerted in this way, this point is valuable only in "fooling" the patient into believing that the plate is held in place more securely than it really is. Even this seeming phenomenal resistance to displacement is not in a majority of cases due largely to atmospheric pressure, since traction produced at this point and in this direction must first overcome the greatest resistance of adhesion.

The remaining point to be considered is the relation borne by the so-called "air chamber" and "relief spaces" to the question under discussion. If a cavity of definite shape be made in the palatine surface of a well-fitting upper plate we have, when the plate is adjusted to the mouth, a definite area of the surface which does not come in contact with the mucous membrane—that is to say, there is adjacent to the mucous membrane a space or recess in the plate containing air. This cavity can be partially exhausted of its air if suction be made with the tongue at the palatal edge of the plate. This causes the soft tissues directly above the cavity to be forced down into it and against its edges, partially filling the cavity and preventing for a time the ingress of air from the outside. Thus a partial vacuum is maintained for a while and the services of atmospheric pressure are secured, but only over the definite area of the vacuum chamber, the amount of force manifested being in proportion to the degree of exhaustion and the area of the space. Over the rest of the surface of the plate a perfect atmospheric balance is maintained just the same as before suction was made.

The length of time which this partial vacuum may be maintained, granting that the plate is well conformed to the mouth, is dependent upon several conditions—first, the degree of exhaustion and the consequent force with which the mucous membrane is held against the edges of the air chamber, thus modifying the facility with which air or fluid may enter from without; second, the sharpness of the angle at the palatal edges of the chamber, a sharp edge making entrance of fluids, etc., more difficult; third, the resistance and porosity of the soft tissues in the region of the air chamber; fourth, the amount and quality of mucus discharged from the glands in and around the area covered by the plate, and fifth, the amount of force tending to dislodge the plate. These five variable conditions modify to a greater or less degree the facility with which the unbalanced atmospheric force reestablishes its equilibrium.

We know that the mucous membrane has the power of absorbing air, which it will readily give up, and that air may even be extracted by suction from the circulation. From these sources and by the gradual flow of mucus and saliva the vacuum is soon reduced and equilibrium is again established. This is illustrated by producing suction on the barrel of a key or a small bottle, and leaving it attached to the lips or tongue; it will hang until the vacuum has been reduced by air extracted from the tissues and then drop off from its weight. This illustration will also indicate the degree of stasis produced in the tissues under pressure by leaving a blue place the size and shape of the opening in the instrument used, and will suggest the degree of inflammation that would soon be induced by the constant irritation from even a slight vacuum.

"Relief spaces" act in the same way as the air chamber, save that it is more difficult to maintain a vacuum in the relief spaces for reasons already suggested.

I have shown that the services of atmospheric pressure in supporting a weight can be secured only by producing a vacuum, that a vacuum can be maintained in the physical arrangement under consideration only by having a cavity of definite shape in the palatal surface of the plate, and that the unbalanced force is manifested only about the definite area of this cavity. Should this force alone be just sufficient to support the weight of the plate (and a less force would scarcely be worth consideration in point of utility) and could other forces be entirely eliminated so that the entire weight of an

ordinary plate might be suspended by about three-fourths of a square inch of the mucous membrane, it is safe to say that the amount of active inflammation that would be induced in the tissues in twenty-four hours would be unbearable.

I do not mean to say it is argued by any one that adhesion does not assist in supporting the plate; the illustration is used only to show that atmospheric pressure sufficient to be valuable even in assisting other forces in the retention of a plate, and manifested only on such a limited area, would be impracticable owing to the irritation it would produce. It must be admitted by any careful experimenter that in a well-adapted plate in a favorable case the force of adhesion alone, acting on the same area of space, would be sufficient to support the weight of an ordinary plate. By this I mean that in a favorable case in which we can eliminate entirely the question of air pressure, we will find that a well-adapted plate will sustain more than as many times its weight as an ordinary air chamber would be contained times in the whole area of surface in contact.

While I do not believe that the so-called "vacuum chamber" is valuable as a vacuum chamber in securing the services of air pressure, I believe that in some cases good results may be had from its use merely as a *relief space,* and sometimes by interfering to a degree with the lateral motion of the plate in cases where there is hypertrophy of the membranes into the chamber. However, I do not wish to precipitate a discussion upon the subject of air chambers excepting to the extent that my subject would suggest.

I have now, to the best of my ability and as thoroughly as my allowance of time will admit, covered the principal points of my subject, and will make a few general remarks. In the experiment with the two plain glass plates, a significant point lies in the fact that if an excess of water be added or allowed to remain around the edges after the plates have been firmly pressed together, we find that capillary attraction is so strongly manifested that the two surfaces are forced so far apart that the full force of adhesion is lost and but little weight will be sustained. This illustrates two valuable points in utilizing the force of adhesion in retaining dental plates in the mouth: first, that the closest contact of surfaces is necessary to secure the greatest adhesion; second, that capillarity, where there is an excess of fluid, will interfere with this close contact and even overcome the force of adhesion altogether by forcing the surface of

the plate away from the mucous membrane. This latter point is illustrated by the difficulty of retaining an upper plate in mouths where there is a profuse flow of saliva and mucus, and it is the removal of the excess of fluid from underneath the plate that is the reason for the frequent pressing up and sucking action of the tongue exhibited by nearly all patients who wear plates. An abnormal flow of mucus and saliva is frequently stimulated or induced by the presence of a new plate in a mouth not accustomed to wearing one, and for this reason a plate that seemed to fit perfectly at first may appear loose and unstable after a few hours' wear.

In order to secure the most perfect adaptation of surfaces in adjusting an upper plate to place, considerable force is necessary to secure contact at every point, and for this reason it is essential that the pressure be equally distributed. If there be hard places in the surface covered by the plate they will receive most of the force and in this way interfere with securing good contact with the more yielding tissues. For this reason the pressure should be "relieved" at these points and the "bearing" increased over the very soft areas. A few laboratory experiments will illustrate what slight inaccuracies of adjustment of two surfaces will lessen the degree of adhesion. The shrinkage of a modeling composition model for a plate without undercuts will lessen the adhesion of the two surfaces more than half of that manifested when the model is first made. This will suggest the inaccuracies that may occur in the construction of dentures from molecular changes that take place from the different processes in the materials used in their construction, and will account for many of the difficulties in securing a perfect fit which are attributed to other causes.

Discussion. *Dr. S. H. Guilford,* Philadelphia: It seems to me that some of Dr. Leonard's statements in regard to physical laws are correct, others involved, and others absolutely incorrect. He speaks about hydrostatic pressure and atmospheric pressure. We have to do with hydrostatics because liquids are involved, but not with hydrostatic pressure. The physical characteristics of air and water are very similar in many respects—one is a liquid and one is not, but both are fluids. A fluid is a substance the particles of which move easily among themselves in all directions. This is illustrated by a standpipe filled with water. The lateral pressure at any given point of its height is just the same as the pressure downward at that

point. This fact is taken advantage of in a reservoir, for instead of building the breast of the dam vertically, so that the water would exert an immense pressure laterally, it is sloped off, allowing the pressure to come upon the hypothenuse of a triangle instead of upon one of its sides.

I think the essayist has mistaken hydrostatic pressure for adhesion, but they are quite different. The two glass plates with a thin film of water between them remain in contact because of the adhesion of the water. The plates must be made as flat as possible and they will not hold together if more than a minute quantity of water is placed between them. Prof. Tait says that adhesion and cohesion are largely synonymous terms. The two plates of glass with the water between give an example of adhesion because there is a foreign substance between them, but if there is no water there they will still hold together, and that is cohesion. It is one of the properties of matter that when substances are brought close enough together they are held there by what is known as the attraction of cohesion, but if there is any considerable space between them that property is not manifested. This is the same in the open air as in the vacuum, and the fact that the plates were placed under an air-pump does not prove anything, because their adhesion does not depend upon atmospheric pressure. I think the essayist has chosen an unfortunate illustration. He says that the relation between the vulcanite plate and the mucous membrane is practically the same as that of the two plates of glass with the water between. He claims that in the case of the mouth we have two irregular surfaces with fluid between them instead of plane surfaces, and that this is an advantage because it increases the amount of surface exposed to the action. That is wrong. Under the laws of physics, if two planes are to be held in contact by cohesion or adhesion their surfaces must be as nearly smooth as possible. You cannot succeed with two plates of roughly ground glass, for with an irregular surface you have spaces that will contain a considerable amount of water, and that destroys the adhesion, for it will occur only at the points which are so close as to contain only a thin film. Again, one object is soft and elastic in the case of the mouth. A better illustration to bring out the point Dr. Leonard desired to make would be the familiar one of the disk of leather which is soaked in water and pressed down on the brick or cobblestone in the pavement when it is necessary to lift out the

latter. If the leather disk were used dry it would contain too much air and would not adapt itself so readily to the surface. In the center of the disc we have atmospheric pressure and around the rim adhesion.

Dr. Leonard says that when you have a vacuum chamber in the plate the exhaustion of air pertains only to the space occupied by the vacuum chamber, and he claims this is not enough to support the plate. Some plates are made with vacuum chambers and others without, and good results are obtained by both methods. In the one case we have a certain amount of adhesion—not perfect, because of the irregular surface, but which is sufficient in many mouths, and in the other case we have a partial vacuum. It seems to me that the matter resolvés itself into the question, shall we depend upon adhesion entirely or upon the partial vacuum and adhesion combined? The essayist contends that vacuum chambers fill up and cease to be vacuums, but if we enlarge the chamber from time to time, as can readily be done in vulcanite plates, improvement will result, which proves that atmospheric pressure acts in the way I have suggested. Perforate the vacuum chamber with a pin, and you will find that while you have eliminated atmospheric pressure the adhesion amounts to at least five-sixths of the surface of the plate, yet I never knew of plates that could be retained under such conditions. I have seen plates which did not fit at all, did not touch more than half the surface, and had no vacuum chamber, but still they were worn. This was simply adaptability, as the patients had become accustomed to them. I have always believed in a vacuum chamber of considerable extent but shallow.

Dr. J. D. Patterson, Kansas City, Mo.: Instead of saying the law of hydrostatic pressure Dr. Leonard should have said the influence of hydrostatics, and then Dr. Guilford's criticism would have fallen to the ground. Dr. Guilford also makes an error in his distinction between the attraction of cohesion and adhesion. Cohesion is attraction between ultimate particles, while adhesion is cohesion en masse between like or unlike substances. I am thoroughly in agreement with Dr. Leonard's claims. Our interest in the matter is large, because if it is adhesion alone that retains the denture, as he has described, then our attention centers in the question of how to obtain the most perfect adhesion.

Dr. W. V-B. Ames, Chicago: I think Dr. Guilford went too far

in misunderstanding Dr. Leonard. The essayist gave us a good exposition of the physics of the case, but at the same time demonstrated that he had never taken advantage of atmospheric pressure in the retention of plates to the extent it can be utilized. He made it plain that in the usual adaptation of the denture to the surface of the parts there are points where there is little tissue—practically only the bone—and the adhesion is very slight because of these points.

The illustration of making a minute puncture in the plate is certainly proof positive that there must be something besides adhesion and capillary attraction in the satisfactory retention of a plate. It is one thing to make plates so that the patients will have to be told they must masticate in a certain way, and another thing to make a plate which fits so well that when they want to take it out to clean it they will be compelled to raise the lip to permit the entrance of air beneath it.

Dr. B. H. Teague, Aiken, S. C.: I believe that plates are held in place by atmospheric pressure to a great extent, and the reason they fail is because there is not proper adaptation and correct impingement on the gum. If you will examine the skeleton arch of the mouth you will find, about three-fourths of an inch from the alveolar border along the molars on either side, the posterior palatine fossæ, which are for blood vessels. When the impression is taken these fossæ are not properly impressed, and unless the model is properly trimmed or adjusted at these points there will be no pressure there. In trimming a model it should be held in the hand, the mouth examined at the same time, and the whole surface of the latter gone over with an instrument. Wherever there is hardness the model should be built up only so far as the opposing point in a plate might press the mouth, and wherever there is softness the model should be scraped, and more particularly so where these fossæ are found on either side of the mouth. When a plate is made in this way there will be perfect atmospheric adhesion.

Dr. Ames: I did not make it plain what I would do to accomplish the results described. I merely run the plate far enough back to reach the sort of tissue which we have in the lips and cheek—simply go far enough around the tuberosity so the entire periphery of the plate can displace tissue of sufficient elasticity to give the condition Dr. Leonard speaks of when you draw down on the front teeth and get the evidence of atmospheric pressure. By displacing the

soft tissue with the entire periphery you get the same effect that you do in drawing down the anterior teeth.

Dr. M. S. Merchant, Giddings, Tex.: In running the plate back so far how do you overcome the inclination to nausea?

Dr. Ames: In some mouths there is this tendency from any disturbance in the region of the palate, but in most cases the nausea is due to the fact that the plate is not held firmly, but is slipping around. As I describe it, however, it is rigidly held at all times. Sometimes patients have not been able to wear a plate in the office, but after experimenting a little at home they have conquered their feelings and have never had a return of the nausea.

Dr. E. A. Bogue, New York: Dr. Ames did not say so, but it is true that he takes particular pains with the articulation in these cases, being very careful that when the jaws are closed the lower teeth shall drive the upper teeth backward and so keep the strong adhesion constantly acting.

Dr. S. P. Sharp, Knoxville, Tenn.: Why do large plates fit so much better than small ones? I have just as good adhesion with the latter as with the former, but the large ones hold better.

Dr. Leonard, closing discussion: Dr. Guilford spoke of my position in saying that hydrostatic pressure was manifested in the case of the two pieces of glass placed together with water between. It is true. Take two plates of glass and place a drop of water on one of them. It is just sufficient to fill all the interstices and the space between the two. It is being compressed by the atmosphere at the rate of fifteen pounds to the square inch of surface, and is resisting at the same rate that the pressure is being exerted on the outside. That is, the water is showing the same amount of resistance to the atmosphere that the atmosphere is manifesting in tending to compress the molecules of the water. When the two plates are adjusted the atmospheric pressure is exhibited directly on the water only at the edges, being excluded at other points. This column of water reacting just as it did before is exerting pressure against the inner surface of the plates, tending to separate them. I think it is a clear exhibition of hydrostatic pressure.

I still maintain that two irregular surfaces offer more surface for the action of the force of adhesion than as if the plate were a plane. I did not say that rough surfaces would exhibit a greater force of adhesion, but that irregular surfaces would expose a greater area to

its action. Of course, the smoother the surface the better is the manifestation of adhesion, but smoothness does not always mean a plane surface, as it may be irregular.

As regards the air hole in the vacuum chamber, that illustration does not prove that atmospheric pressure is the force which holds the plate. We have all seen plates with holes in them worn comfortably. The air may come in and break up the adhesion, as the breath will drive air through the hole and against the mucous membrane, and the adhesion is lost by forcing the two surfaces apart.

Dr. Ames made the point that the plate could be drawn down and then be pulled back again. That phenomenon cannot be attributed to atmospheric pressure more than to adhesion, because we know that adhesion will admit of elasticity of the membrane being manifested, and when you draw it down you get the effect of the elasticity on the plate. We know that this elasticity of the membrane will be manifested in an effort to dislodge the plate. Dr. Ames also refers to the plate extending back onto the soft tissue beyond the hard area, and I mentioned that same point in my paper, in regard to the outer edges of the plate remaining adherent longer, providing you had an elastic membrane all around the periphery and the hard areas in the center. The adhesion would be last overcome along the elastic surface, but the separation of the two surfaces—the plate and the hard areas—would be so slight in advance of the other that the air absorbed by the mucous membrane would relieve the slight unbalance and you would not find the atmospheric force of any practical value. I think the point is conceded by those who make the plates, that the hard areas usually extend clear back to the edge of the plate and that the plate should be trimmed off about the edge of the hard palate.

Dr. Ames: Are you not willing to admit that I have secured the results which I have described?

Dr. Leonard: I do not doubt your results, but I am speaking of what generally obtains. I admit that you can get a degree of unbalance which will aid in the retention of the plate in that way, but it is usually of such minor importance that it cannot be considered as of practical value. As regards the vacuum created under the lip by trying to remove the plate, the lip immediately collapses, following up the edge of the plate, and no space is created. Ordinarily there is no space between the lip and gum, and when the plate is

moved down the tissues will fall into place and there will be no space in which there could be a vacuum.

In answer to Dr. Sharp's question, the more surface we have exposed to the force of adhesion the greater will be the manifestation of that force.

SECTION I.—Continued.

What Position Does the Prosthetist Hold in the Profession of Dentistry?

PAPER BY F. H. BERRY, OF THE SECTION.

Twenty years or more ago the profession was divided into two branches, which were known as operative and mechanical dentistry. The operative class of men seemed to frown upon the mechanical branch as being the laborious, dirty and unscientific part of the profession, a part which needed but little or no dental education, aside from possessing the gift of natural mechanical skill. It was then the universal belief that the mechanic need not know anything about anatomy, physiology, chemistry, or in fact any of the scientific branches. The students in the colleges and even the teachers naturally leaned toward the operative department as being the backbone of the profession. The tendency, both in argument and in journal literature, was to elevate dentistry to the plane of medicine, even creating a strife to gain recognition as a specialty of medicine.

Later on, as the mechanical man began to grow, due to his own mechanical skill and inventive genius, the operative men began to envy his position, but their dignity would not allow them to join the ranks under the name of mechanical dentists, so came about a change of name from mechanical dentists to prosthetic dentists or prosthetists. Then for years the non-mechanics, clothed in the name of prosthetists, tried to practice the mechanical art, but like the girl who aspires to be a star opera singer, but whose voice is not adapted to the part, and who soon drifts back to her true vocal worth, that of a chorus singer, so the would-be prosthetists of bygone days gradually drifted back to operative work. However, after their eyes had been opened so as to enable them to see the larger field of dentistry afforded by prosthesis they were not con-

tent to go back and confine themselves to the smaller field provided by operative work alone. For this reason came about the custom of doing part of the process, and sending that portion which required skill to a kind obliging neighbor, who was satisfied to rank as a mechanic, and who felt a pride in helping his less skillful colleague and in convincing him that prosthesis was not so easy.

Due to this practice soon came about another branch. To-day it is known as the mechanical or manufacturing laboratory. This division brought about another condition. When the mechanical laboratory was born a few of them were operated by prosthetic dentists, who had made prosthesis a life study—such men, for instance, as Dr. Haskell, the late Dr. Bonwill, and a number of others. In those days prosthesis and the mechanical art were practiced together, but now in later years the dental laboratories are operated in some instances by the highest class of purely mechanical dentists.

I am sorry to say, however, that not many of these men profess to know anything about prosthesis. They receive from their customers an impression or model, with more or less data regarding color or size of teeth, and construct thereon a high grade of mechanical work, such as a crown, a denture, or a piece of bridgework, without so much as ever seeing the patient, and without giving the work a thought from the prosthetic standpoint. What is the result of this division? It has driven much of that which rightly belongs to dentistry into advertising offices, where the work is being done by the mechanic and not the prosthetist. The consequence is that many of our patients, not being able to discriminate between the two classes, are led to believe that it is not necessary to pay even moderate prices for crown and bridgework and artificial dentures, when they can save so much money by going elsewhere. The only value they put on such a piece of work is estimated by the number of years it will last, and whether the process of construction *hurts* or not.

This feature may seem to be degrading to our dental profession, and it perhaps was so for a time, but on the other hand it has created or stimulated a higher appreciation of true prosthetic work, both among the public and the profession itself. To-day most of our colleges are teaching prosthesis in its highest sense, while a few years ago the teachers' efforts were given almost entirely to technic

laboratory training, and the construction of all kinds of appliances, without reference to patient or surrounding parts.

It has been asserted by one of the best prosthetic men in the country, that prosthesis cannot be taught or acquired. It must be inborn as is a talent for music or painting. I disagree with him on this point. It would be very discouraging indeed to think that it is not possible to learn dentistry unless it is born in us. I say dentistry, because it is my belief that nine-tenths of dentistry as practiced to-day is prosthetic. What is porcelain filling, for instance? After you have exerted your knowledge of dental anatomy in preparing a cavity, is not all the remaining process mechanical or prosthetic, even to the cementing in of the finished filling?

In other words, if a dentist is not a good mechanic can he put in a good contour filling, can he construct a good crown or bridge, can he intelligently decide which teeth or roots will serve the best purpose for abutments of a bridge? He needs to know something of the results of strain or stress on the parts in question before he can intelligently decide what class of appliances is best suited for the case in hand. So I say that if to-day we ignore all that is prosthetic and mechanical in dentistry there will be left only a small bundle of that which we may expect to derive from the profession of medicine. How then can we ever expect to look upon dentistry as a specialty of medicine? Dentistry is an art and science by itself, distinct from all others, but compounded out of many arts, trades and sciences. Dentistry is prosthesis and prosthesis is the highest order of dental mechanics. Perhaps the best definition for prosthesis is the art of restoring lost organs and tissues by artificial ones.

Perhaps you will contend that I do not make any distinction between true art and science, that is, in the sense of art being the ability to do a thing and science the knowing what to do. I do not see that it is possible to make this classification or division in dentistry. A man may be an artist, as are many of the workers in our mechanical laboratories, but I cannot see that he can practice the science without being an artist. He must know how to do before he can decide what to do. The result of prosthesis is science and art going hand in hand, and the separation of these two divides the dental profession from the mechanical laboratory. Knowing then the advance stage at which the dental profession has arrived, do

you not think it folly to assert that this branch cannot be learned or acquired without possessing the inborn quality which goes to make the artist in our profession?

Prosthesis is being taught and is being practiced by many of the brightest men in our profession. It is being recognized by both the public and the profession, and both are learning to look for a higher class of attainment than is displayed by a mere piece of mechanical structure. To-day the quality which goes to make a good prosthetist is envied by our less skillful brothers. Instead of being the frowned down, dirty branch of our profession, it is to-day being looked up to as the essence, the very cream, of the art of dentistry. It is one of the live wires of American dentistry. It is that which makes the foreigner look up to American dentists as being the best on earth. It is the prosthetic technic course of our colleges which attracts the foreigners to our schools. If they wanted simply the medical specialty feature of dentistry they could perhaps do as well or better at home. The American is praised the world over for his mechanical ingenuity, and so American dentistry is built upon the same rock foundation—*mechanical ingenuity*. How can we then but contend and believe that prosthesis is American dentistry?

We must get it out of our heads that in order to be professional men we must be a near kin to the medical men. The men who think, contrive, manipulate, and educate mechanical skill in themselves are the true dentists of to-day, and in my estimation they are the men who are building and who will build up the grand profession of dentistry to a point equal to but not a part of medicine.

SECTION I.—Continued.

A Plea for Increased Attention on the Part of Students and Practitioners to "Mechanical Dentistry."

PAPER BY C. M. WRIGHT, OF THE SECTION.

Natural teeth are a twentieth century luxury and not a physiological necessity. This remark was made in a paper on Riggs' disease, read at the tri-state meeting at Indianapolis, June, 1901. It was not a reckless or casual statement, but the result of a good deal of perplexing thought. The perplexity and the thoughts were forced upon me by an extensive observation of many mouths, bristling aggressively with the products of modern dentistry, and yet in a condition of profound sepsis. Oral hygiene and oral physiology had evidently never been taken into account by the dentists when they inserted their operative marvels.

We have always within easy reach proofs of the improvement in local and general health from the insertion of entire artificial dentures. We see numbers of teeth in crippled and diseased conditions which are retained by desire of the patient and acquiescence or solicitation of the dentist, which twenty-five or thirty years ago would have been surgically removed without a protest, and the question must arise, did the older dentist have a broader conception of the importance of maintaining the "physiological balance" in his patients than does the practitioner of to-day, with his complex notions about contour, and crowns and bridges?

In a recent paper I related the case of a brother and sister, eighteen and twenty years of age respectively. The boy had been to some gas establishment and had every tooth extracted. I was called upon to insert full plates mounted upon vulcanized rubber. The sister had been and still is struggling with a marked predisposition to caries, pericementitis and gingival weakness, and has

chronic discomfort from her teeth and gums. She has some forty fillings, four gold cap-crowns, a viscid saliva, congested gingival margins, and many loose teeth. Her breath is often fetid. The brother, with his clear eyes, rosy cheeks, and mouth and breath like a baby's, is a constant example to the sister of the superiority of artificial teeth for use, comfort and cleanliness, to say nothing of expense.

The boy's case is an unusual one in this day of dental service, though less uncommon forty or fifty years ago. In those days men like Allen, Hunter, Corydon Palmer, and other fathers in dentistry considered the construction of artificial dentures as a *sine qua non* of the dentists' art. These men could be found daily at the foot lathe, at the molding table, at the forge and anvil, at the furnace, at the kiln—all in the legitimate line of practice in the profession.

They called it mechanical in distinction to operative dentistry. Then came the era of the operator, with the neglect of the laboratory. The building of cohesive gold into corners and cusps filled the minds of practitioners, to the practical exclusion of the mechanical part. Laboratories were banished from first-class dental offices, and the demands of people in need of substitutes for lost teeth were met by a separate class of men, whom the profession tried to ignore and unwillingly regarded as dentists at all. To be an "operator" was the ambition of the student and of the practitioner.

A third of a century ago, when I "held the chair of mechanical dentistry" in a "dental college," a senior class sent a protest to the board of trustees against the rule of the college that a certain time each afternoon should be devoted to laboratory work. One reason offered for the protest was, "that mechanical dentistry was becoming obsolete; that it would not be necessary for the future dentist to know how to swage gold plate, mold zinc dies and solder metals." At that time the dentist expected to know how to take an impression of the mouth, as this was operative in character, so that if he meddled at all with the inferior and degrading branch he might send to some laboratory workman and have the masticatory machine made to measure, just as the oculist sent his prescriptions to the optician, and the surgeon his maimed patient to the artificial limb manufacturer. The dentist was to be known as an operator and not as a mechanic.

Another era came, and gold crown and later "bridge" cases became popular. Then the dentist fitted up small laboratories or ornamental benches which could be placed in corners of the operating rooms, and began to do with his own hands the finer, smaller mechanical work of swaging, soldering and fashioning these caps and crowns and bridges. For "plates" he still sent to the common laboratories.

The porcelain era seems to have come upon us now, and skill is gradually being directed away from the gold contour and the gold crown and turned toward this cosmetic (?) dentistry of refined mechanics.

During these later eras or waves of fashion in dental art there still has remained a large and constantly increasing demand for artificial teeth mounted on plates. A high degree of mechanical skill is required in this department, and in no other work of the dentist can the artistic taste be exercised to such advantage.

That this noble art has been neglected by the better class of dentists for a quarter of a century is apparent in the mouths of Americans. We have fallen behind other nations, especially the English and the French, in this art part of our profession. Our position in regard to biology, microscopy, special therapeutics and general pathology places the dentist on a footing with the best medical specialists. We have reason to be proud of many logically conducted scientific experiments strictly within the limits of our professional work during the last few years, and the time has arrived when the broad-minded dentist, with his expanding knowledge, should be able to reason clearly and estimate correctly the value of the various kinds of service the dentist can offer to the world.

He should be able to overcome a fad, a rage, a fashionable demand of the day, whether this has arisen from men specially skilled in some one department, or from easily influenced patients. His judgment should declare positively in favor of wholesale extraction and entire artificial dentures when necessary to the best physiological condition of his patient, no matter what the habit and thought of the profession or people may be. Health, usefulness and beauty are frequently better conserved and more easily promoted by skill in this neglected branch of dentistry than by the most modern inventions for the retaining of natural teeth.

As keen observers of all conditions pertaining to the mouth and

teeth, and with a picture of an ideal physiological state of oral secretions and soft tissues, and a knowledge of the systemic effects of pathological oral conditions, what value can we place upon a tooth *retained* by ligature? Of a gold crown upon a tooth with a pus-forming pericemental membrane? Of a bridge resting on suppurating piers? Of an inlay decorating an invalid and useless tooth?

We have made wonderful progress in the direction of saving teeth from the forceps, but we are violating a fundamental principle in surgery and a basal proposition in pathology. For these reasons I should urge an awakening from its long sleep of the old era of mechanical dentistry, and this in the interests of health and esthetics.

The lengthening to four years of the dental college course seems to me to furnish the opportunity for this. Two full years of the course should be spent in the laboratories. No boy should be allowed to pass into the junior class, nor into the operating rooms until he has become an expert mechanical dentist. A two years' apprenticeship to the art of manipulating gold plate, silver plate, cast plate, vulcanite and continuous gum is all too short for the large majority of students. Even the shoemaker and the tailor require a much longer time before they can make by hand their products.

When we consider the impression-taking and the prosthetic adaptation for restoration of the functions, the two years of laboratory work does not seem adequate. We have not referred to the art part at all. This in itself is worthy of a life's best work. The dental student should be an apprentice to an art as well as a student of a science. Mechanical dentistry is not removed from surgery or medicine so far that it need be looked down upon, and it is so near to art that we should be proud to cultivate it.

SECTION I.—Continued.

Easy Methods of Experimentation in Plaster and Vulcanite.

PAPER BY STEWART J. SPENCE, OF THE SECTION.

Plaster of Paris has three defects as respects its use in our art, namely, expansion, insufficient hardness, and contraction under heat. Perhaps I should add a fourth—warpage—but this is included under the headings of expansion, and contraction under heat, its two forms of warpage resulting from these two radical faults. The expansion of plaster as used in dentistry is threefold: 1. An expansion occurs during the act of setting or crystallizing, is accompanied by heat, and ceases in about half an hour. 2. A much smaller expansion continues during the following twenty-four hours, and is perhaps due to absorption of something in the atmosphere. 3. Another expansion occurs during vulcanization, and is caused by steam, being absent when vulcanization is done by dry heat.

An easy method of experimentation by which you can verify the first-mentioned expansion is to fill an upper impression tray with a mix of plaster. When setting has occurred you will be able to see easily with the naked eye a space between the tray and the plaster, amounting usually to about twelve folds of No. 20 tinfoil. The space is frequently not apparent until the cast is removed from the tray and then replaced, because the effort of the plaster to expand lineally has enough force to slightly bend outward the buccal flanges of the tray. The flanges, however, offer increasing resistance and check this linear expansion, on which the plaster, in its effort to further expand, bows upward, so warping. Doubtless some expansion is prevented by the resistance of the flanges, for if plaster is sufficiently confined—by being poured into a cannon ball, for instance—no expansion can occur, the molecules being compelled to remain more closely together during and after the rapid movements in crystallization than they do where they have room to spread out.

An easy way by which you may verify this assertion, that bowing up occurs when linear expansion is restricted, is to tack down on your bench two little strips of lath about a foot apart, and pour a strip of plaster between them. When setting has taken place you will find that the plaster strip has bowed up at its center. Next pour a similar strip of plaster on the bench with its ends free to expand, and you will find that no bulging occurs.

As a third experiment, and to verify the assertion that expansion occurs during vulcanization, take the cast which you poured in the impression tray and run it through the vulcanizer. On attempting to replace it on the tray after this ordeal you will observe a great increase of expansion, so much that now fully twenty-four folds of No. 20 tinfoil will pass readily into the space between tray and cast at the palatal dome. Here let me interject a caution—cool the vulcanizer slowly during this last experiment, because rapid cooling tends to cause a plaster cast to explode and thus unfits it to return to the tray. This fact should be remembered by those who use plaster for investments in vulcanizing, especially if used green (newly set), because this breaking up of the plaster will permit a greater shrinkage of the vulcanite in cooling than would otherwise occur.

Let us pass on to the subject of insufficient hardness of plaster casts. Because of this defect they compress during flask-closing, even with rubber, and much more so with celluloid. They act similarly in swaging with shot, and also permit contraction of the vulcanite plate in cooling. To easily test this first assertion, fill the lower half of the flask flush with plaster, soap the surface, and fill the upper half. When set open flask and place between the halves fifteen or twenty grains of red rubber, heat in boiling water, and screw down the flask. Now, as there was previously no space between the two plasters it is evident that if the plaster is not compressed by the rubber nearly every particle of the latter will be squeezed out at the edges of the flask. As a matter of fact, the opposite will result, and probably none of it will find its way out, as it will force a bed for itself in the plaster. The explanation of this fact is that the soft rubber under compression by the plaster becomes no longer soft but hard, and thus reacts on the latter. Furthermore, my experiments show that where rubber is unevenly packed the compression of the model will be correspondingly uneven.

Another evil arising from the softness of plaster is that the teeth are displaced by being forced into the investment, notably in celluloid work. This is the chief cause of dark joints in sectional gum dentures, the blocks being driven into the plaster in flask-closing, thus spreading their joints. The insufficient hardness of plaster is again exemplified by the fact that it suffers so much during vulcanization as to be unable to control or prevent the effort of vulcanite to contract in cooling.

That vulcanite contracts in cooling can be readily verified as follows—take the flask last mentioned, which you remember was filled with plaster, and cut in the plaster a little groove reaching nearly across the flask, into which vulcanize a strip of rubber. Then remove this strip from the flask and trim it down until it reaches exactly across the lid of one of the little metal boxes in which rubber and wax come to us. Now immerse the strip for a minute in water heated to 130 degrees, F., placing also thermometer in the water. On taking out the strip, chilling and replacing it in the lid you will probably observe no perceptible change, but repeat this operation at 140 degrees and a slight contraction will clearly appear—about one sheet of thick note paper. At 150 degrees, 160 degrees, and 170 degrees the contraction will increase at about the same rate or rather more, and at 212 degrees the shrinkage will amount to about 1.0 mm.

Let me digress to say that I have cause to believe most misfitting plates are too large, and that they may be made to fit much better by being thus contracted in warm weather. There is no danger of warping them in this process, as vulcanite contraction proceeds evenly when it is free to move. When a plate is warped it is because the plaster investment holds one side of the plate more firmly than the other, thus throwing the burden of contraction on the side held more loosely.

The third defect of plaster is its great contraction under heat, which interests especially the metal plate and large bridge worker. To test this simply and easily, fill with plaster one of the metal lids mentioned, remove the cast from the lid, and stand it upright on one end over a fire. If necessary to support it in this position it may be placed in a metal pot filled with sand. After being thoroughly heated it will be found on replacement of the metal lid much more contracted at the end that was more heated. If, on the

other hand, this cast instead of being placed as described had been laid flat over a flame which would reach only its central portion, this portion would undergo the contraction and in so doing would probably warp out of the original shape. To prevent both of these evils the plaster should be liberally mixed with some other substance. Heat passes very slowly through plaster, but when it is mixed with something else, such as marble dust, the cast is made much more soft and porous, thus being more permeable by air and consequently a much better conductor of heat. The heat being thus more evenly disseminated, unequal contraction does not occur to so great a degree or indeed any contraction. Such porous casts have the further advantage that they can be heated soon after being poured, water escaping from them readily. My experiments in this line are not yet completed, but I have demonstrated by many tests that an investment which is meant to be heated to incandescence should not have more than 25 per cent of plaster—that is, if the contraction of the investment is to be considered. Unfortunately an investment of so small a percentage of plaster is very soft, and should it fall during soldering it is almost certain to break into pieces. Thus we are between Scylla and Charybdis with the soldering investment question—an excess of plaster causes contraction, while a minimum causes softness.

I would suggest that for easily testing the contraction of investment compounds you use the lower half of a Whitney flask, placing it filled with the investment to be tested over the fire until incandescent. You will perhaps be surprised to then find that this will cause a space of two or three millimeters between the flask and shrunken investment, even with some of the most extensively sold investment compounds.

However, while our profession is, I think, as yet without an ideal investment for soldering, the outlook is more cheerful in the case of plasters for plate work. During the past year your essayist has been using with satisfaction a non-expanding plaster for impressions and a non-expanding, hard-setting plaster for models, investments, etc. The latter being about fourfold harder than plaster of Paris maintains the integrity of its form in flask-closing, and remains sufficiently firm under the ordeal of vulcanization to came out about tenfold harder than similarly vulcanized plaster of Paris, thus preventing all effort of the cooling vulcanite to lapse from the shape

given it by the model. A cast of this plaster poured into an impression tray will be found not only devoid of expansion after crystallization, but if passed through the vulcanizer, according to the test suggested for plaster of Paris casts, will come out unexpanded. The solidity of this plaster is not obtained by merely mixing some other substance with plaster of Paris. Excepting sand probably no substance will give density to any appreciable extent. The method by which its great hardness is obtained is very similar to that by which we get hardness and non-absorption in oxyphosphate of zinc fillings. We know that by adding the powder little by little to the liquid, and by long mixing, even up to two minutes, and finally by rolling the mass between the thumb and finger, we get a well-compressed, hard-setting pellet which will endure immersion in red ink for forty-eight hours with only a film of stain on its surface. On the other hand, a pellet of thin and slightly-mixed oxyphosphate will stain all through in that time.

A very easy method by which can be determined the relative hardness, or rather the relative resistance to compression, for this is the form of hardness most desired by the dentist, of two different kinds of plaster, is to pour one kind into one section of a vulcanizing flask and the other kind into the other section, then open the flask when the plasters have set, insert between them a steel or lead ball, and screw the flask together again. On reopening the flask you will see two depressions made by the ball, the depth of which will give the relative compressibility of the plasters. If the flask is now run through the vulcanizer a similar test with the ball will give the relative strengths of the two plasters after vulcanization, so indicating which of the two will better resist the effort of vulcanite to contract and warp in cooling.

In writing this article I have intentionally omitted all intricate and difficult methods of experimentation, suggesting only such as are, while correct in their results, very easily performed, and which require no instruments other than those which every dentist has in his office.

SECTION II.

Dental Education, Literature, Nomenclature, Histology and Microscopy.

Coeducation in Dental Colleges, and Is Dentistry a Suitable Calling for Women.

PAPER BY J. A. CHAPPLE, OF THE SECTION.

Reared in an atmosphere and among traditions that well nigh forbade the thought of woman ever becoming a bread-winner, or man's competitor in the race for honors, our environment was very naturally averse to the theme. But as landscapes are vastly dissimilar, our environments are no less so, and we therefore deem it appropriate, as we assemble in this garden of nature, fashioned by the hand of omnipotence, where the blue hills lift their heads near to nature's heart, midway in the stretch from Maine to Mexico, that we can for the moment forget geographical lines and remember only that we are equal heirs to the priceless heritage of a reunion, and that the narrow prudence of the puritan and the generous error of the cavalier—both good enough and bad enough in their way—are blended at last in the twentieth century American, more charitable in thought than either and equal in execution to both!

It is interesting, not to say something surprising, to note that coeducation in the colleges and universities of the United States was not adopted first in or near the recognized center of literary culture of New England, but that it had its birth in Oberlin College, Ohio, in 1833. From that date to 1870 a few colleges, located principally in the middle West, fell into line with Oberlin. Not until 1870 and 1872, however, can it be said that coeducation began to receive genuine and sincere endorsement at the hands of the leading educators of

the country, finally culminating in its adoption by eighty per cent of the colleges and universities of the United States in 1898.

As one of the strong proofs of the growing popularity of coeducation we direct your attention to the following statistical statement: "In 1890 there were studying in coeducational colleges 16,959 men and 7,929 women; or women, in other words, formed 31.9 per cent of the whole body of students. In 1898, a period of eight years, the attendance had increased to 28,823 men and 16,284 women in coeducational colleges, women forming 56.1 per cent of the whole body of students. Between 1890 and 1898 men in coeducational colleges increased 70 per cent, while women increased 105.4 per cent." The author adds, "There is every reason to suppose that this increase of women will continue."

Confronted with this formidable array of figures, supported by the fact just stated, that eighty per cent of the colleges and universities favor coeducation, how can we consistently oppose it in our dental colleges? Can we object on the ground that the woman has the smaller brain and is therefore of inferior mentality? This will not withstand the force of logic or observation, for did not the learned Professor Bishof argue woman to be an inferior creature, "Because she possessed a lesser quantity of gray matter than the average male?" and yet, *mirabile dictu,* a post-mortem found that "the professor had considerably less than the average female's allowance of brain." Can we object to woman's presence in the class-room on the supposition that she would lower the general average of the student body? This also is a cruel fallacy, as shown in the annual reports of the presidents of coeducational schools.

Shall woman be debarred from the dental class-room for physiological reasons, or sex relationship? We lay down the proposition that the class of women seeking a dental education will not be found among the frivolous, the undecided and the timid, or among the masculine and aggressive advocates of women's rights. We cannot in fair argument assume either. More likely she will prove a woman of determination, quietly bending her energies to the work of mastering a science; a thoughtful woman who has weighed the difficulties in the prospect, and steeled her resolution to meet them in patience and in dignity. False pride, yielding to common sense, will

give her assurance that such few physiological tangents as may be necessary in the scope of a dental curriculum and discussion will be clothed in professional language and chastened by a consciousness that all that is said and shown in her hearing is for the single purpose of instruction in a noble art. The moral question, as affecting coeducation, has never been raised in the art studios of the world where the sexes elbow each other in sketching from living models, nor has it been at all seriously considered in coeducational medical schools, where sexual relation and function enter so prominently in the lecture course.

The absolute efficiency of the trained nurse and assistant, who stands by the side of the operating table a witness to and willing helper in every form of surgical operation, has long since dissipated the thought of her incompatibility, or that her relation to surgeon or patient is any other than a veritable benediction to both.

Since, therefore, we find that woman's mental capacity is no hindrance; that because of her presence in the male class the general average is in no sense affected, and that physiological or moral reasons are not prohibitive factors to her seeking a dental education under coeducational conditions, coeducation in dental colleges should be fostered and encouraged for the greater reason of its refining and quickening influence upon the student body. From a limited personal experience in college work we can cheerfully bear testimony to the good effects of a woman's presence in the class-room, as not only affecting the student in his general conduct, but upon the lecturer as well, especially when tempted to adorn his well-rounded periods with a story better untold.

The refining influence of woman is well exemplified by Wendell Philip's story of the young man in the smoking-car, who excused himself for using questionable language by emphasizing the fact: "There are no women here." The majority report of the learned committee appointed to investigate the subject of coeducation in the Boston public schools in 1890, among other considerations favoring the system, said: "This check upon questionable utterances and acts is noticeable in all places where boys or young men are in companionship with the opposite sex, and *herein lies the greatest good resulting from coeducation.*"

President Angell of the University of Michigan in one of his annual reports employs the following strong language: "After our nine

years' experience in coeducation we have become so accustomed to see women take up *any* kind of university work, carry it on successfully, graduate in good health, *cause no embarrassment in the administration* of the institution, and *awaken no special solicitude in the minds of their friends or teachers,* that many of the theoretical discussions of coeducation by those who have not had opportunity to examine it thoroughly read strangely to us here on the ground."

While the foregoing testimony bears witness to woman's refining influence in literary schools, it must be remembered that moral influence is not a question of latitude or longitude, and if her moral force is for good among literary, why not among dental students? As final evidence on this point, hear our own Professor Peirce. Writing to us recently, he said: "I am now and always have been in favor of coeducation. It is now nearly thirty years since I admitted women to our dental school on the same footing as men. When it was first done I was much amused one day to have a committee of students present themselves in my office on what they considered important business. 'Well,' I said, 'gentlemen, what is the business?' They said they came to protest against women being in the class. I replied, 'Well, gentlemen, I believe you have not been asked. When I want your opinion on the subject, I will send for you, but I want to tell you now that the women are here to stay.' This ended the whole contest, and we have had women ever since. They first have a refining influence; there is less boisterousness, vulgarity and profanity; less spitting and other unseemly conduct. This of course has reference to the laboratory, but in the lecture room also they have a modifying influence, so that conduct is always improved by the presence of the female sex. I have no *private* opinion on this subject. I am unconditionally for coeducation. The rose always adorns the bush even though it is thorny."

Is Dentistry a Suitable Calling for Women? Though we have deliberately chosen to answer and support the affirmative of this proposition, fair assumption should throw the burden on those who would debar her, for surely woman ought not to be denied any acquisition of skill and learning that may bring her comfort and happiness, merely because she is a woman. Time was when she could not inherit property, when she had no legal existence save only as it was merged in the husband, but age did not sanctify error; courts of law

gradually—reluctantly perhaps—but finally and distinctly abandoned the myth of a civil duality, and they now hear her in the forum and guard her rights to earn and own property and dispose of it according to her own sweet will.

Let us remember that not only the right of woman to find employment and earn her living is already established, but the necessity for it is upon many of them, and this necessity arises from many causes. Vital statistics show more females than males in the world's population, so marriage is impossible with all; the depopulation of the males through the vicissitudes of war, and the fickleness of individual fortune, are facts that must be faced with calm resignation, and should appeal to our humanity and enlist our best efforts as to how best to solve the problem, even if in the solving it should ultimately restrict man's sphere of activity.

Desiring to get an expression from an intelligent and appropriate source among the laity, we addressed a note to the president of a normal and industrial college for girls, asking him if he believed "dentistry was a suitable calling for women." He replied that he thought dentistry was entirely unsuitable for women, and gave three reasons, to wit: "1. The work requires constant standing on the feet, which is as a rule a bad thing physically for women. 2. The work requires a very considerable degree of physical strength, especially in the hands, and physical endurance. Women as a rule have not, I believe, the necessary physical strength and endurance for this work. 3. The work requires, I should think, remarkably strong nerves. Women as a rule have delicate and sensitive nerves, and are therefore unfit for this work." And this distinguished educator adds: "The above comments on women apply, I believe, to the *normal, healthful and well-organized woman.*"

Assuming that the objections here quoted voice in the main the sentiments not only of those of the laity who oppose woman's entrance into dentistry, but of the general practitioner as well, we shall adopt them as a basis for our contention. 1. Her physical condition being more delicate, she should not choose a vocation which requires her to stand on her feet during long hours. To this we answer that the same argument would apply with equal force to the thousands and thousands of saleswomen and shop-girls who must and do undergo this fatigue and discomfort, and if she be a "normal, healthful and well-organized woman, her capacity for endurance in her

chosen field of labor should be equal to the "normal, healthful, and well-organized" man in his allotted sphere of action. The time consumed in standing at the dental chair by the average practitioner is infinitely less than that occupied by the average saleswoman, and is certainly under more hygienic and comfortable conditions. That solicitude for women which trembles at the prospect of her encroachment on professional territory (hitherto occupied by men only), while it looks complacently on thousands of her sex toiling at *harder* work, seems strangely inconsistent with sympathy and deplorably deficient in logic.

The second objection raised by our critic is that "the work requires a very considerable degree of physical strength, especially in the hands." Barring possibly the strictly surgical feature of dentistry, in isolated instances this may be true; but for all other demands the strength of her hands is entirely adequate. We contend that no greater demand is made upon the hands of the woman dentist than upon the hands and strength of the girl who manipulates a typewriter or spends two hours daily at a piano exercise. Moreover, no such degree of physical strength is requisite to the successful practice of dentistry now as formerly. With present day methods and instrumentation brute force is placed at a discount, and knotted muscles are no longer a match for trained minds, clear eyes and a cunning hand, even though they be the mind, and the eye and the hand of a woman.

The day is not far distant—indeed, it may be said to have arrived already—when woman shall be no longer regarded as an exotic and when she shall be compelled to forego the natural trend of her inclination by reason therefor. The Federation of Women's Clubs and other agencies have done and are still doing a great work to emancipate their sex from a chronic anemic condition, by the introduction of dress reform and by encouraging every form of rational physical exercise. The institutions of learning throughout the country have caught the infection, and at Wellesley College alone "one thousand young women are required to enter into a thorough course of physical training," and according to the authority we quote, "It is represented that these students pride themselves on their excellent physical condition, which they first endeavor to attain before subjecting themselves to serious mental strain." In 1898 there were 1,397 women studying medicine in the United States, 174 studying pharmacy, and

162 studying dentistry. Which of these three is the greater test of one's physical endurance? To ask the question is but to answer it.

The third and last objection raised by our distinguished friend is, that "the work requires, I should think, remarkably strong nerves. Women as a rule have delicate and sensitive nerves, and are therefore unfit for this work." We answer that a women with a nervous organization is not likely to seek dentistry as a profession, nor does this criticism apply to women with any greater force than to nervous, sensitive men. When a woman obtains consent to seek employment in untried fields—in man's so-called exclusive domain—she is presumed to have investigated their exactions and requirements. Indeed, such a woman will likely be endowed with not only sufficient physical courage, but marked individuality as well, a trait of character most prominent in those men who have achieved success in their respective vocations. Is it not rather late in the day to offer "delicate and sensitive nerves" as a barrier, when Clara Barton and thousands of her followers have long since shown this to be a mere figment of the imagination by their heroic conduct in the hospitals, the sanitariums, and on the battle-fields? Many a woman who would swoon at the sight of a mouse will bear more fatigue and witness with more calmness nerve-racking scenes at the couch of pain than the biblical Hercules who slew the lion and pulled down a temple.

While our distinguished critic failed to note what would prove perhaps the most serious drawback to woman's entrance into dentistry, namely, her probable deficiency in mechanical execution, we shall anticipate the objection and meet it as briefly as possible. If we are correct in our premise that a woman seeking a man's vocation does so from a natural inclination, or an innate love and fitness for the particular work chosen, the logical inference is that she possesses more or less ability to sustain her in her choice. While every woman is not endowed with the constructive mind and dexterous hand of a Rosa Bonheur, no one will deny that she is at least eminently imitative. What is more exacting, not to say exasperating, when the model of fashion demands of the present-day dressmaker that her gown shall be so constructed as to simulate the outlines of a Venus? But she does it, and yet she has not the advantage of a plaster impression, into whose irregular form the plastic material may be moulded; but she must rely upon an exact measurement in

inches, guided by an unerring eye for symmetrical curves and geometrical lines.

But why indulge further in speculation when over five hundred women dentists have already arrived and are practicing while we preach? It has been our privilege to meet her in the lecture room and at the clinic, and we failed to discover any want of application or lack of understanding to distinguish her from other students. On the contrary, in theory she was equal to and surpassed many, while at the chair the proof of her handicraft in no wise suffered by comparison. In not a few instances we also discovered in her development of individuality of character and genius for expedients, elements ofttimes so needful in the mastery of a difficult problem.

The prospect of a cultured woman writing D. D. S. after her name and putting money in her purse need stir our sympathies not half so much as the picture of a sad face and figure struggling for sheer existence in the orthodox sphere of home. Take it where you will, there lives a woman who must face the problem of existence and learn to take care of herself, to say nothing of the stubborn fact—more is the pity—that she has been known to take care of her husband also. And if it should come to pass that woman in her loveliness shall be woman in her strength, with womanhood never diminished, we in manhood's generosity must not hinder but hold the door of opportunity ajar and at least give her entrance to her wish in the field of endeavor. If she fails she first will find it out. If she wins we first shall place the laurel upon her brow and welcome her to her just reward.

But however much we may philosophize we must finally accept the conclusions of Kate Field when she said:

"They talk about a woman's sphere as though it had a limit!
There's not a place in Earth or Heaven,
There's not a task to mankind given,
There's not a blessing or a woe,
There's not a whispered yes or no,
There's not a life, or death, or birth,
That has a feather's weight of worth,
Without a woman in it!"

Discussion. *Dr. H. A. Smith,* Cincinnati: I have the honor of being connected with the college which graduated the first woman in

dentistry. That was in 1866, when Prof. Taft was dean of the Ohio Dental College. After starting in practice this woman at first received little sympathy or support from her own sex. Her women patients were critical and sometimes even abusive if any mishap occurred in the treatment of their cases. All this has changed, and now women and children are largely the patrons of the women dentists. As to their success, it may be stated that they usually succeed in establishing a lucrative practice in a shorter time than do the men. I speak now of the women dentists who escape matrimony and the cares of a family, which latter do not as a rule contribute to their success. The belief expressed that women are temperamentally unfitted for the practice of dentistry is not well founded. The woman who takes up this work seriously is able in a short time to overcome the timidity or nervousness which may possess her at first. As stated by our essayist, the presence of women in the classes gives dignity, and although their influence in the college is wholesome. My only objection to women in dentistry is that the work is too hard for them. The practice of our profession is both exacting and laborious, and I am old-fashioned enough to believe that all the real hard work in the world should be done by men.

Dr. Jonathan Taft, Cincinnati: This woman to whom Dr. Smith refers was a student in a dental office in our city. When she applied for admittance the teachers and even the trustees of the college objected, but she was finally admitted. The benefit accruing from having a woman in the class was never more manifest than in that case. She would not permit the use of cigars or cigarets in the laboratory, she objected to the boys chewing tobacco, and anything she did not regard as proper she criticised, until the conduct of the students was revolutionized. We have had from three to ten women each year in our classes at the University of Michigan, and I have watched them carefully and studied this question. As the years go by I become more and more convinced of the feasibility, practicability and efficiency of women in the practice of dentistry. On the average their success is more uniformly good than that of the men, and in almost every instance they have succeeded. In one case a man and woman were married when they graduated. The husband proved a failure as a dentist, but the wife has a lucrative practice and in addition takes good care of three children. A woman has the strength necessary for the extraction of teeth or any other operation, and it

does not require as much strength to practice dentistry as it does to cook, scrub floors or stand over a laundry tub all day, or even as much as it does to meet the demands of a family of children and take care of a house.

Dr. Garrett Newkirk, Los Angeles: I wish to express my admiration for the most excellent paper on this subject that I have ever heard. It states exactly my experience in the college which I represent, for I consider our women students a great addition to the classes, and they are a comfort to every teacher. The finest operator, the best gold worker, in our last year's graduating class was a woman.

Dr. C. V. Vignes, New Orleans: In a class of eighteen in the New Orleans College a frail young woman carried off all the honors, excelling especially in prosthetic and operative dentistry.

Dr. H. A. Smith: Recently in our city some have been advocating that young women be trained in our colleges for the special work of dental prophylaxis. As outlined by Dr. C. M. Wright, this training would consist of lectures on the anatomy of the mouth and teeth, special pathology and physiology, and a special clinical training in prophylactic therapeutics. It is suggested that after finishing the prescribed course the colleges should issue a certificate showing competency. It is assumed that some of these young women would seek employment in dental offices, while others would receive patients in their own apartments or visit them at their homes. These subspecialists would confine themselves strictly to the practice of oral prophylaxis, and if they should be tempted to engage in general practice they could be curbed by the present state dental law.

SECTION II.—Continued.

Conservatism in Dental Education.

PAPER BY S. W. FOSTER, OF THE SECTION.

To write on the above subject I can hardly do more than reiterate. Dental education is a hackneyed subject; one which has during the past fifteen years engaged the attention of every class of men in the profession. The good, bad and indifferent at almost every society meeting have let no opportunity pass without expressing an opinion, volunteering suggestions, and not infrequently assuming a pessimistic view, concluding by deploring the state of affairs and charging the colleges with being responsible for a majority of the evils which appear to them to exist, such as receiving and graduating illiterate and incompetent men, turning loose upon the world dishonest advertising charlatans, etc. That such conditions exist in a measure cannot be denied, and that these criticisms of the colleges have brought forth good fruit is also an established truth.

The great cry both in the colleges and in the profession has been for a more elevated standard of preliminary requirement. The progressive advances in dental education demonstrate earnestness on the part of the colleges to meet this demand. But let us inquire, are we consistent in our advances? Has the crystallizing thought in our colleges reached the proper conception of what these so-called higher qualifications should consist? That a thorough literary course plays an important part in attaining this qualification cannot be denied, but that it is the all-important requisite is a most erroneous idea.

Morality, mechanical genius, persevering diligence and other qualities are as important factors in making a satisfactory student and an all-round successful practitioner as a diploma from a liter-

ary college. It is the exception where men who are failures and who drift into advertising quacks come from the ranks of those who are endowed with these principles. I do not mean to infer that failures more frequently come from those who are graduates of literary colleges, but an educated man who does not maintain a high moral character, persevering diligence and manipulative ability will not prove a success or an honor to his profession.

The greatest influence for evil in the dental profession at the present time is the attempt on the part of some to rob dentistry of its professional robe and drag it down to the level of an advertising commercial business. Who are the men doing this, may I ask? The answer is not found in their not having a literary degree, but in their lack of true morality, honesty, manly worth and correct college professional training.

Let us cast about and see if the profession is not somewhat justified in charging the responsibility to the colleges. They have gradually increased their standard till the requirement for entrance without examination is a certificate of entrance into the third year of a high school. This requirement seems sufficiently low, but I am convinced that it meets every necessity.

Great emphasis too has been placed upon this feature by the colleges and profession, while hardly a passing consideration is given to any other requisite. Are the colleges in a measure not responsible to the profession for results when they receive into their classes young men without first inquiring into their fitness from a standpoint of honesty of purpose and purity of heart to cross the sacred threshold of the dental profession and assume that all but sanctified responsibility of which the degree of Doctor of Dental Surgery should be the insignia?

I have a tenfold more buoyant hope for the ultimate success of the student who presents himself with perhaps only a moderate education, limited finances, and from an humble home, but who comes with the benedictions of a godly parentage, and who brings the sparkle in his eyes of radiant, ambitious hope, and presents his church certificate and credentials of high moral character, than I have for him who comes with an arrogant air of conscious superiority, immaculate in his dress, and who presents his college diploma and condescends to enter upon the duties of a dental student.

Let the colleges admit young men with sufficient education and

whose hearts are right, then teach them the principles of truth and honesty, embodying *all* that is contained in our code of ethics, as earnestly as they teach dentistry per se, and when these shall have completed their college course let the profession extend to them an encouraging, sympathetic, helping hand, and the time will come when the man who deliberately dishonors his profession will be all but extinct.

Dentistry is a compound profession. To become a success a student, in combination with other requisites, must have manipulative ability. Many a man otherwise qualified has drudged through college only to meet with disappointment and failure on account of deficiency in this important essential. Unfortunately we have but a limited opportunity of ascertaining this quality before a student enters college, but thanks to our modern methods of technic instruction the colleges are enabled to form an accurate idea of the student's ability during his first year, and it is the duty of the college at all times to discourage those from continuing whom they have reason to believe cannot accomplish this department of their work satisfactorily. Thus by our systematized methods of teaching it is possible to weed out, as it were, the greater failures during their college course.

This is an age of progress and it is gratifying to note that during the present generation dentistry has not only kept pace with but has outdistanced other professions, and our mode of teaching during the past twenty-five years has developed from a heterogeneous mass until we now have the most completely systematized curriculum of any profession. Our preliminary requirements are equal to the average college teaching of either medicine or law. We have added more to our curriculum during the past twelve years than any other profession, and it is expected that beginning with the next college term one more year is to be added, making four years before a student can receive his diploma.

Let us ask if in our eager progress we may not possibly be moving too rapidly in advance of proper legislation? Does this advance at the present time really benefit dental education and the profession? In a limited way we answer in the affirmative, but in the main I fear not. Let us reason. We have lengthened our course year after year, and at the same time we have raised the entrance requirements and are annually concentrating and facilitating our method of teaching with the use of modern appliances, such as electric motor

power, X-ray demonstrations, projective microscopy, etc. With our system of technic is it not reasonable to suppose, notwithstanding the fact that the useful media of our profession has daily taken deeper root and broadened, that modern advantages offered the student are equivalent to these advances? Who will deny that the freshman student to-day receives as much instruction and acquires as much knowledge in dentistry as did his predecessors ten years ago in two years? The momentum of the present in every department of life is such that time is an important factor.

The National Association of Dental Examiners says to the colleges, "We will not class you as reputable unless you teach a prescribed time before graduating a student." At the same time the laws in many of the states say that any man may apply for license before the state board, and if found proficient he shall be made a legalized practitioner whether he holds a diploma or not. What are the facts? These same gentlemen, members of the N. A. D. E., are granting licenses year after year to men who have taken only one or two years of college work. Does this indicate that these men are incompetent or that the boards are derelict in their duty? Not by any means; but through their intelligence and the modern method of teaching they have been equipped for practice, and notwithstanding that they would most highly appreciate a diploma, the value of time and force of circumstances are of such importance that they seek their only alternative (which under the law is the highest authority after all), and that is a license from a board of examiners. What is the result? In those states not demanding by law a diploma the profession is becoming crowded with undergraduates who have been licensed by the boards. For statistical reference I mention the great state of Texas with about eight hundred practicing dentists less than forty per cent of whom are graduates. These conditions are not sectional, for we find about the equivalent ratio in Rhode Island, Vermont and New Hampshire.

Is the four-year course wise with our present laws? Will not the lengthening of the term deter many from putting forth the extra effort to obtain their diplomas and cause them to seek the board for license at the end of one of their intermediate college years? I apprehend that this will be the tendency and am persuaded that too rapid progress in advance of legislation is not best, but that a greater number could be benefited and a higher average edu-

cation attained should our enthusiasm be hedged about by conservatism and the standard for graduation be kept within the radius of an encouraging zone.

Discussion. *Dr. M. S. Merchant,* Giddings, Tex.: After fifteen years' experience on examining boards, six years of same being since the present law went into effect, I believe that with the high preliminary standing that is required three years is long enough, for in that time a man can absorb enough education in the dental line to enable him to practice successfully. I heartily agree with Dr. Foster, especially as regards the preparation of the heart as well as the mind.

Dr. H. W. Rodgers, Boston: While the essayist spoke of high preliminary requirements, I think he is inconsistent when he condemns the man with the college degree. He spoke of his arrogance. In my relations with college men in the school I have failed to note this arrogant attitude, unless quiet manners and culture are arrogance. In the last graduating class of the dental school with which I am connected were five men holding the A.B. degree, and they were graduated with the cum laude degree, which shows that they attained the highest efficiency in their class. I strongly condemn sentiments which will tend to discourage college men from entering the profession of dentistry.

Dr. E. A. Bryant, Washington: Dr. Foster's paper seems to merit commendation. The gentleman who has just spoken has evidently not taken into consideration another teacher of high standing, Dr. E. C. Kirk, and his remarks as to the students under his care. At the meeting in Stockholm a year ago he sent a letter stating that his experience was that the best students, who produced the best work and made the best dentists and the least failures, were the men from the manual training schools and not those with college degrees. We need men with the degree of M.D., as there are certain scientific branches which are absolutely required in city practice, but they are not needed by the general practitioner. If we were educating all our dentists to be specialists and to practice only in the cities that might to some extent hold good, but we are also educating them to practice in small towns and in country places. The higher educational theory has been going on for some time under the three-year course. I have made the statement before that the three-year term has not turned out better dentists than

were made in two years. Other studies have been added, but as a rule they are not such as will be of advantage to the young practitioner. Dr. Brophy tried to establish a college which would accept only students with an M.D. degree, but it was a complete failure. According to the courses of to-day we have not dental colleges, but adjuncts to universities. Dentists as teachers are becoming scarce, and the teaching is done now from the medical standpoint. The dental student is pursuing studies laid down for the medical student for the purpose of educating him in medicine and not with the special idea of his practicing dentistry. In the present condition of confusion you will have a hybrid that will be neither a dentist nor a physician. Although he has taken almost the same studies as the medical student, who will say that he has knowledge enough to practice medicine? Formerly we had an assistant in the office and he became the dentist. Then mechanical dentistry was relegated entirely to the assistant, but to-day we do not need mechanical dentists as assistants. We have a mechanical laboratory which is taking out of the hands of the young men this class of work, which as a rule they are competent to do when they start, and it is also practically taking the bread out of their mouths, but at the same time it is the result of present methods of teaching.

Dr. S. H. Guilford, Philadelphia: As a profession we stand in a peculiar position, having the theoretical side on one hand and the practical on the other, so we should view this question from both sides. It is desirable that all who enter upon the study of dentistry should have a good preliminary education and it is apparent that there should be an inherent liking for mechanics. Without both of these good professional men will not be turned out, but if I had to choose between the young man who was deficient in preliminary education, but had a taste for mechanics, and vice versa, I should take the former, not that I undervalue the early training, for I had my own son take the degree in arts before studying dentistry. Study was easy for him, but there were others who stood just as high in the class who had never had the same early opportunities. We must consider the service the dentist will be able to render his patients, for that is the important thing. I have known many men without good literary training who settled in small communities where the people were willing to overlook this deficiency, and they succeeded very well. Many of those who have shown the best re-

sults have had some previous training in mechanical arts—young men who had learned watchmaking or had worked in factories making delicate parts of machinery. They were skilled, and their hands and eyes were trained, so that they did their work in the most perfect manner. I think young men of this type will render the best service to the patient.

Dr. T. W. Brophy, Chicago: Dr. Guilford speaks of the theoretical and of the mechanical side of dentistry, but I hold that there is no such thing as the theoretical side of dental teaching, for dental teaching is scientific, and scientific teaching is not theoretical. We have the scientific side and the art side. It is not only scientific, for it is based on the results of careful investigation and is really an art. Theory should never be taught. It should be investigated in the laboratory, and after a theory has been sufficiently tried to establish a fact the fact only should be presented to the students. As Dr. Bryant remarked, a number of years ago the Chicago College attempted to make specialists of medical men by accepting and graduating only medical men as doctors of dental surgery. Perhaps there was at that time a very good reason for so doing, but the dental college curriculum has been so broadened that it now embraces all the different branches of medicine and collateral sciences, and is presented in such a way that to-day there is not the necessity for the course of medicine that existed twenty years ago. The course of instruction has been multiplied at least threefold. If it was necessary eighteen years ago to have two years of six months each, it is certainly necessary now to have four years of seven months each, for we have more than twice as much to teach as we had then. I don't believe it is the proper thing to intimate that the college man is not inclined to place himself in the proper relation to the dental school and gather all the information obtainable therein, nor to suggest that he has not as great an ability to develop in mechanical dentistry as those of less education. It is not his training that will detract. We are apt to fall into this error of thought because some men who have not had the college training, but have had all that the essayist outlined as the best qualities of manhood, have succeeded. It is not just to say that the college man does not possess these qualities also.

Dr. Jonathan Taft, Ann Arbor: Dr. Brophy has taken up a very profitable line of thought. The dentist should be educated not only

to make little mechanical appliances, but to develop himself into a true man—a strong, cultured man who shall have an influence for good and who shall benefit mankind. Many seem to think that if they have the mechanical skill it is enough, but many dentists of great mechanical ability have no influence and command little respect in the community because of their lack of education. The men with mere handicraft occupy a narrow groove in life, and they cannot reach outside of it and take hold of those things which should be grasped by dentists if they are to occupy the position they should as professional men. Are the uneducated dentists the ones of whom we feel proud? Are they the men who raise the standing of our profession in the eyes of the world?

Dr. Garrett Newkirk, Los Angeles: I have wondered at the distinctions so often made between theoretical and practical, and I wish we could get rid of those terms. Everything you teach the student in the way of scientific study—physiology, materia medica, applied science, physics—is not theory, but practice. It is something he needs to know whenever he has use for it, and he will have use for it. It is not manipulative dexterity alone that is practical—his knowledge is practical, and the more he has the better it is for his patients.

Dr. F. B. Noyes, Chicago: I do not think we will ever have the A.B. degree as a requirement, and I doubt if it would be advisable, but let us not discourage A.B.'s from entering the profession, for certainly they do not make it worse. A man with manly qualities is not hurt by any amount of education; he is less of a man without education than with it.

Dr. H. E. Roberts, Philadelphia: The Pennsylvania Board has never found occasion to reject a man because he had too much education, but I have seen men fail because they had not enough. I am surprised that some members of examining boards seem to think it unnecessary that the students have a four years' course.

Dr. H. B. Tileston, Louisville: As I understood Dr. Foster, he said he would rather receive into his school a young man not equipped with a high preliminary education, but impressed with the necessity of confining himself strictly to study, than one with an A.B. degree, who felt himself superior to the profession which he was entering. I do not think Dr. Foster is opposed to higher preliminary requirements for entrance to our colleges. The fear ex-

pressed by him that the state boards would graduate men into the practice of dentistry in spite of the colleges if the preliminary educational requirements were advanced beyond a reasonable limit seems to me to be well founded. This brings up the count system, by which a student would be given credit for his attainments, and if this is ever adopted, as I believe it will be in the near future, the colleges and the boards will not be far apart in their purposes.

Dr. Foster, closing discussion: I would not have anyone think that I place any depreciation whatever on a college man, for I hold that the more education the better the man. We put great stress on the preliminary education, but I emphasized the fact that while this is important there are other things equally so. The great trouble with the men possessing college degrees is that their training has been along literary and not manipulative lines, and they are inclined to think that they have a bettter equipment and can learn dentistry a little easier than those without a degree. In regard to Dr. Brophy's remark that we have twice as much to learn as we did fifteen years ago, I would repeat that we have better facilities for learning now than then. A young man who has the ability to learn dentistry can learn it in three years in a good school, and four years of seven months are a hard strain, financially and otherwise.

MINUTES OF THE SEVENTH ANNUAL MEETING

OF

THE NATIONAL DENTAL ASSOCIATION,

HELD AT

Asheville, N. C., July 28-31, 1903.

FIRST DAY—MORNING SESSION.

THE morning session was called to order at 11:15 o'clock by the President, Dr. L. G. Noel.

Dr. Rawson, on behalf of the Asheville Dental Association, presented the President with a unique gavel, requesting that it be used during the present meeting. The gavel was accepted by the President with a few well chosen remarks.

Prayer was offered by Rev. Frank Siler of Asheville.

Louis S. Bourne, City Attorney, made an address of welcome, which was responded to by Dr. James McManus of Hartford, Conn.

Dr. E. J. Tucker of Roxboro was then introduced and presented the following welcome on behalf of the state of North Carolina:

Members of the National Dental Association, On me has been conferred the honor and pleasure of extending to you a cordial and hearty welcome to the hospitality of our State Dental Association, and it is as spokesman for this body that I greet you to-day, and, using the words of Milton, we say truly, "Thus we greet thee with our early song, and welcome thee and wish thee long."

Yes, the most cordial welcome of our hearts is yours, the fullest friendship of our social life is yours. May this short respite from anxieties, cares and practice bring to you all pleasure and profit, may the deliberations of this honorable and scientific body be guided by wisdom, and the full measure of success crown every honest effort for progress in our profession and the betterment of humanity. May a communion of thought and spirit in this great gathering of scientific men bring increased strength and attainments, that shall inspire us for greater research and progress in our pro-

fession. The blending of the two great dental associations a few years ago made plain the fact that state lines exist no longer in the hearts of the true American.

By love we are a united nation. We remember that, back in the sixties, on the sacred soil of old Virginia, brothers' blood of the North and South ran together and made crimson the waters of the Rappahannock River for freedom, and freedom came, when the fair angel, who so long left us, finally laid her hand upon the leaping heart of this embattled nation and said, "Peace, Peace, be still." Thank God that we accepted the result with a resignation and fortitude that a generous North can but commend. And we of the South would not have it otherwise. No! Thank God that we bury the dead past and can now sing on both sides of Mason's & Dixon's line, "Yankee Doodle" and "Dixie." Yes, we meet on this auspicious occasion, forgetting all our lesser differences, and as we enter this hall, the livery of our special section, our creed and our politics are taken from us at the door, and we put on the court dress of our noble fraternity.

We meet as brothers; we have no badges but our diplomas, no distinctions but our years of graduation; all of us are born equal into this great fraternity. Welcome, then, welcome all to this our joyous meeting. Here, of all places in the world, we may best hope to find the rest and peace we seek. Here, in the Switzerland of America, "The land of the sky," where the men are gallant and chivalrous, the women beautiful, gracious and kind, where the waters run pure and the air gives vigor, the birds sing sweetly, and the flowers bloom more beautiful, yes, here we may climb upon God's own "spy rock" and behold all nature in perfect accord with its Creator. To this land we welcome you.

It is a joyous reflection, the wonderful progress in our profession within the past sixty years, and the men who have given renown and distinction to it. "Men o'er whose brow age has been flung, but whose hearts, whose hearts, are ever young." You and they who have borne the burden in the days past, and labored with heart and hand, must feel a pardonable pride in seeing your labors thus rewarded. Our Taft, Black, Brown, Fillebrown, Johnson, Darby, Kirk, Noel, Gallie, Carr and others in scientific investigations; Cryer, Brophy, Jarvie, Barrett, Truman and others in oral surgery; Goslee, Head, Hinman, Reeves and others in porcelain inlay; Bogue, Angle and others in orthodontia; Peck, Smith, Crawford, Turner, Jones, Gray, Bland, White, Everett, Campbell, Gorman, Burkhart, Finley, Betts, Ottolengui, Thorpe, Morgan, Griffith, Meeker, Stubblefield, Beadles, Crenshaw, Foster, Holland, Patterson, Libbey and countless numbers in the field of operative and prosthetic dentistry, and the great educational movements in our profession. I mention now two names to whom gratitude from the dental profession can never be given commensurate with their services—Dr. Crouse, our protector, whose wisdom, labors and expenditure of means have saved to the dentists of America hundreds of thousands of dollars, and Dr. Donnally, who has given much time and expenditure of money in the best years of his life in honest unselfish endeavor to bring to the dentist military status commensurate with civil. These I mention—with numbers all over the country

their equals—are the watchmen whom we cry to and ask what of the future of our profession, and they tell us to look back, far back into the past, and up, and up, with pride see the rapid progress, the wonderful discoveries, inventions and great achievements, and catch inspirations from these to look on the open sky and say, "Glory in the highest," as we see burst forth on both horizons, east and west, the dawn of the perfect day in the future for us as a profession. I might mention the great discovery of Horace Wells, giving to the world anesthesia, and forever enshrining his name in the hearts of man and placing his statue in the temple of fame.

What can we say of him who gives to the body surcease from pain and supplants the frown by a smile? Praise his name forever more. But I must not forget my commission, that of welcoming you to the hospitalities of the grand Old North State.

Welcome, ye who preach courage and meekness; welcome, ye who are training the generous youth on whom our profession looks for its guardians. Welcome, ye quiet scholars and editors, who, in your studies, are shaping the thought of our profession.

Welcome, ye whose healing ministry soothes the anguish of the suffering with aid of art and the tender accents of compassion.

We welcome you as the representatives of one of the greatest scientific bodies in the world. Every wave which breaks upon our eastern shores sings to you a glad welcome.

Every breeze which stirs the boughs of the lofty pines, whose fragrance adds an aroma to the air, chimes sweetly to you, welcome.

Swananowa, nymph of beauty, your crystal waters roll on to join the brimming river, and chatter, chatter, as they go. Welcome, welcome, welcome.

From the mountains to the seashore we extend to you a hearty and cordial welcome. Our hearts, our homes, and our hands are yours to command.

This was responded to by Dr. Burton Lee Thorpe of St. Louis, on behalf of the Association, as follows:

It is a most happy privilege to be called on to respond to these words of welcome, so ably uttered by the distinguished representative of the profession, in behalf of the "Old North State" and the sunny Southland.

Of all welcomes, *the Southern welcome is the best.* It has a ring of genuineness and hospitality *not* in other welcomes. I voice the sentiments of this entire audience when I say we are delighted to be here; we are just as glad to be here as you are to have us here.

As I came up here, a few days ago and viewed this beautiful scenery from the car window, the grandeur of the mountains and the sky and the picturesqueness of French Broad River, I thought that God must have indeed smiled when he created this country, and I could but exclaim, as did the venerable and revered Pope Leo, who has just gone to his reward, when for the first time he stood before Raphael's masterpiece, the "Sistine Madonna," and exclaimed, "Magnificent! Wonderful! Beautiful!"

My friend, Dr. V. E. Turner of Raleigh, told me last spring, when he was in St. Louis, that if I came to Asheville, I would find the altitude so

high I could commune with the angels, and, after being here nearly a week, I know Dr. Turner was correct, for I have indeed been communing with the good angels of Dixie—whose hospitality and good fellowship are renowned, whose fair daughters are noted for their beauty and purity, and whose sons have the large, rich red corpuscles of professional pride and patriotism coursing through their veins.

I am reminded of the fact that Asheville is the county seat of Buncombe County, made famous by Governor Vance, in whose honor that impressive granite shaft in yonder square is erected. Vance was twice Governor of North Carolina, and for a number of years was a U. S. Senator from this state, and he made himself and his state famous by originating the utterance I have heard many of you frequently repeat since coming here—"And the Governor of North Carolina said to the Governor of South Carolina, 'It's a long time between drinks.'"

Vance was a great talker and orated on all occasions; he did this to make his constituents believe he was earning his salary and ably representing them. He talked long and loud, and as soon as he began his associates would leave the Senate Chamber and remark, "He is talking for Buncombe," or, "That is all Buncombe." Thus the origin of an oft-used expression. I imagine it is expected of me to-day to give you some "Buncombe," but instead I want to refer to some brief historic facts.

To-day we stand on historic ground. If we look backward and review the past, we find North Carolina has to her credit many historic incidents that endear her to the nation. Off her shore, at Roanoke Island, July 4, 1584, the first Englishman landed on American soil. This was prior to the landing of the Pilgrims at Plymouth or the settlement at Jamestown, and was the expedition of Sir Walter Raleigh, whose men were the first to plant the English flag on American soil. Raleigh's expedition was followed by numerous others, who brought brave-hearted, liberty-loving men and women, who were forced to combat with starvation, Indian wars, debts, yellow fever, unjust taxation of British parliament, and the frequent marauding visits of the famous Capt. Kidd, "Black Beard," and other pirates, who made life a terror for the coast residents. These early settlers were composed of the sturdy Englishman, the prudent Scot, the thrifty German and the ardent Irishman, who, with their families, scattered among these hills and forests, and, by combined effort, helped build this mighty and gallant nation.

No state in the Union has to her credit the accomplishment, I say, of greater historic events than North Carolina, whose pioneers are glorious examples of patriotism and chivalric daring, whose life blood in the early days cemented the foundation of American liberty. This is proven by their gallant conduct at the battles of King's Mountain, Guilford Courthouse, Newbern, Alamance, Moors Creek, Elizabethtown and Hanging Rock, and many other battlefields, where patriots' blood baptized this soil. Prior to the Boston Tea Party the North Carolina colonists, at Brunswick in 1765, filled with righteous indignation, revolted against the Stamp Act, forcibly seized the stamp master, and threatened to burn Governor Tyron's palace.

Their remonstrance was listened to by the Governor, who promised to make amends and use his influence to right their wrongs. This was not done, and on North Carolina soil the first blood of American colonists was spilled for liberty's sake, by English troops, at Alamance, May, 1771.

Here, in North Carolina, also, the colonists first threw off the yoke of British oppression, at Charlotte, May 20, 1775, one month after the battle of Lexington—when the citizens in convention signed the Mecklenberg Declaration of Independence, which was the first Declaration of Independence, signed and declared one year before the Philadelphia Declaration. This was one of the original thirteen states which composed the "United States of America." Thus we must recognize North Carolina as an important factor in the formation of the Union, for on this soil is the real birthplace of this great Anglo-Saxon Empire, and the birthplace of American independence.

August 18, 1587, Virginia Dare was born. She was the first child born on the American continent of English-speaking parents and was the daughter of Annimias Dare, private secretary to Governor White, and who married the Governor's daughter.

North Carolina has done much for other states, especially of the West and South. She is the mother of Tennessee and gave to Tennessee her first Governor, the famous Seveire.

In North Carolina the youthful days were spent and the bold spirit was trained of a man whose name will ever live as a projector of civilization, whose boldness and bravery will ever be revered by Kentuckians and Missourians. I refer to that great pioneer, patriot and pathfinder, Daniel Boone, who was reared in North Carolina.

John Harris of Bainbridge, Ohio, who was the preceptor of his brother, Chapin A. Harris, and James Taylor, both afterwards prominent in our profession as progressive pioneers, was one of the first to practice dentistry in North Carolina, locating here in 1835, to be followed by other men of intellect and high character, whose names will go down in history as the skillful pioneers of North Carolina dentistry. Some of the most prominent are Sterling Wheadon and his student, W. R. Scott, who graduated at the second commencement of the Baltimore College of Dental Surgery and who was the first graduate of dentistry to practice in North Carolina. Other good men are W. F. Bason, J. W. Howlett, whose name is prominent as the inventor of the first automatic mallet, J. W. Hunter, (during the Civil War he refused to perform military duty, claiming dentistry was an exact specialty of medicine. This matter was taken to the Supreme Court and the eminent Chief Justice Richmond Pearson decided Dr. Hunter's contention was correct and that dentists were exempt from jury and military duty. This was the first decision of the sort ever rendered in the United States.) E. R. Hubbard, R. P. Bessant, E. B. Andrews, Thos. B. Carr, Samuel Martin, B. F. Arrington, the first President of the North Carolina State Dental Society, who is present to-day, V. E. Turner, and many others whose careers will shine as a beacon light to coming generations.

At Littleton, N. C., during the winter of 1836-7 "The Father of American Dental Science," Chapin Aaron Harris, operated by day and burned the

midnight oil far into the morning writing his first book, "The Dental Art," afterwards called "Harris' Principles and Practice." Thus we see North Carolina people have been brave in war, God-fearing and liberty-loving, prosperous in peace and active in promoting the interests of your profession.

Dr. Tucker, in behalf of the members of the National Dental Association, I thank you sincerely for your cordial and generous words of welcome, and hope we of Missouri next year may have the pleasure and honor of reciprocating your hospitality, during the greatest event in the history of the dental profession—at the Fourth International Dental Congress—when Imperial Missouri as host, and St. Louis, the Queen of the Mississippi Valley, as hostess, will unite in extending you all the same whole-souled, generous Southern welcome that you this day have tendered us.

I bespeak the sentiments of the National Dental Association and their guests to-day when I say we appreciate the worth and character of the members of your state society, we appreciate your progressiveness and professional loyalty, and I know all our members here to-day join me in this sentiment—our benediction—when your life's work here is ended and the eye has dimmed, the hand has lost its cunning, and the feet have grown weary as they near the river of the Great Beyond, may the good you have done humanity and your profession, the homes you have brightened and the hearts you have gladdened, cause the gates on high to swing ajar and the choir celestial to sing, "Well done, thou good and faithful servant."

The secretary made an announcement regarding meetings of the various sections.

Those desiring to give clinics were asked to report to Dr. Robt. H. Nones.

At the request of Dr. Hall, the Swananoa Club tendered to the members of the Association the privileges of the Club for seven days.

All desiring to visit Biltmore were requested to register before one o'clock Wednesday.

Dr. Patterson, of the Executive Committee, requested those having railroad certificates to report to Dr. A. H. Peck as early as possible. Dr. S. W. Foster, Chairman of the Local Committee, announced that Pullman cars must be ordered here.

Dr. C. C. Chittenden, of Madison, Wis., Vice-President for the west, then took the Chair when the President, Dr. Noel, read his address.

On motion by Dr. G. V. I. Brown of Milwaukee, the President's address was referred to a committee, to be reported back at a future meeting. Carried.

The Chair then appointed as this committee Drs. C. N. Peirce of Philadelphia, Garrett Newkirk of Los Angeles, J. G. Fife of Texas.

H. J. Burkhart, Chairman of Executive Council, called attention to printed program.

Dr. Peck requested all delegates to report to the Executive Committee at earliest possible moment.

The President announced that all business matters should be presented to the Executive Council.

On motion, Association adjourned to meet at 7:30 p. m.

FIRST DAY—EVENING SESSION.

The evening session was called to order by the President at 8:20 o'clock.

The minutes of the previous meeting were read and approved.

Dr. Burkhart announced that General Miles had detailed W. H. Chambers to represent the Army Board at this convention, and moved that he be granted the privileges of the floor. The motion was supported and carried.

It was announced by Dr. Burkhart that Mrs. Gorman had invited the ladies accompanying members to this Convention to attend a tea at the Knickerbocker Hotel from 5 to 7 Wednesday evening, and moved that the invitation be accepted with thanks on behalf of the Association, which motion was carried.

A paper was then presented by Dr. C. N. Thompson of Chicago, entitled "The Preparation of Cavities for Inlay Fillings." Dr. Thompson's paper was discussed by Drs. Jos. Head, E. A. Bogue, T. T. Moore, R. Ottolengui, W. A. Capon and F. B. Noyes.

At ten o'clock, the hall being required by the local committee to arrange for a dance, a motion to adjourn was offered and carried.

SECOND DAY—MORNING SESSION.

The morning session was called to order by the President at ten o'clock.

The minutes of the previous meeting were read and approved.

The Chairman of the Executive Council reported as the program for the morning session, the closing of the discussion on Dr. C. N.

Thompson's paper, also the finishing of the work in Section III, and if time served, the calling of Section IV.

Dr. Thompson then closed the discussion on his paper.

Dr. Joseph Head of Philadelphia then read his paper, entitled "Influence of the Inlay on Modern Dentistry," which was discussed by Drs. G. V. Black, C. Edmund Kells, Jr., J. Taft and B. H. Teague.

A paper was presented by Dr. T. P. Hinman of Atlanta, Ga., on "The Preparation of Cavities and the Use of Pins in Contour Porcelain Inlays". It was discussed by Drs. L. E. Custer, F. B. Noyes, S. M. Boles, C. B. Colson and R. B. Adair.

Dr. Patterson, Chairman of Section IV, then read his paper on "Etiology," which was discussed by Drs. S. J. Spence, M. L. Rhein and D. D. Smith.

Report of Dr. Thos. Fillebrown, Chairman of Section V, was presented.

Report of Chairman of Section V.

The past year has shown no great progress or discovery in either anatomy or surgery, but much has been accomplished by research to make more clear the facts discerned in the past.

In pathology the identification of the smallpox bacillus has made the year notable, the account of which discovery by Councilman is published in the *Boston Med. and Surg. Journal.*

In a paper read before the American Medical Association in June, 1902, Dr. V. A. Latham gives an interesting and instructive "Resume of the Histology of the Dental Pulp." Also a paper (DIGEST, August, 1902, page 658) by Dr. R. R. Andrews, read on the same occasion, on "The Embryology of the Dental Pulp," is of much interest. Dr. Talbot also read a valuable paper before the same association on "The Evolution of the Pulp" (DIGEST, May, 1903, page 584).

In the DIGEST of April, 1903, page 449, appears an excellent article on the "Comparative Anatomy of the Teeth," by D. F. Luckey, read before the Missouri State Dental Association.

In the *Dental Cosmos*, 1902 (DIGEST, June, 1903, page 708), ap-

pear a series of papers by W. D. Miller, entitled "Introduction to the Study of Immunity in Its Relation to the Diseases of the Mouth and Teeth," which are worthy the attention of every thoughtful student.

Harvey Cushing (*Annals of Surgery,* 1903) reviews experimental operations in the surgical treatment of facial paralysis by nerve anastomosis. The facial nerve, severed at a point near the stylomastoid foramen, was united to accessory nerve, the "end lateral" suture being employed. The author gives an interesting account of his own successful case, with gradual restoration of function.

A. E. Schmitt (*Am. Jour. Med. Sciences,* 1903) contributes to the surgical anatomy of the temporal bone, describing a procedure for extensive dissection of the mastoid. By certain boundaries he outlines a square upon the surface of the process which he again divides into four equal spaces. These subdivisions in almost every case correspond to (1) mastoid antrum in upper anterior square; (2) the lateral sinus in upper posterior, and (3) to the mastoid cells in the two lower. The surface thus being mapped out, operations at this point are greatly facilitated.

"An Operation for the Radical Cure of Aneurism, Based Upon Arteriorhaphy" is the subject of an interesting article by R. Matas in *Annals of Surgery,* 1903. In the operation described the sac is not extirpated nor disturbed, further than to evacuate the contents. The orifices of the artery in the sac are then sutured from within, thus preserving the lumen of the vessel.

Harvey Cushing in *Annals of Surgery* calls attention to causes of shock as being injuries exerted on peripheral afferent nerves, producing a fall in blood pressure, and emphasizes the fact that the liability to shock is lessened by perfect hemostasis, but where large nerve trunks must be divided local cocainizing will prevent the profound depression which follows extensive operations like amputations.

C. H. Cargile (*Hot Springs Med. Jour.*) suggests a plan for avoiding adhesions after laparotomy by covering the stumps, pedicles and denuded surfaces with serous animal membrane. He uses portions of the peritoneum of the ox, the membrane being thoroughly sterilized. "Animal velum" is the name given to it, and it is nonirritating and readily absorbed.

H. P. Mosher (*Boston Med. and Surg. Jour.*) gives the result of the use of Cargile membrane in preventing adhesions in the nose after operations, particularly cautery. He states that next to the peritoneum the nasal cavity is most liable to adhesions, and gives a favorable report of the effects of animal velum used in small wedges between opposing surfaces.

Willard Bartlett (*Annals of Surgery*), under the title of "Surgical Anatomy of the Middle Crania Fossa, With Special Reference to Operations for Removal of the Gasserian Ganglion," gives an average of measurements indicating the position of the middle meningeal artery. This vessel varies to such an extent as to be a great source of danger in chiseling.

In connection with the subject of "Healing of Nerves" C. A. Balance and Purves Stewart (*Annals of Surgery*) have established a theory of great clinical importance. They have proven that the distal segment of a divided nerve is not the inert, degenerate, passive structure which depends for its repair solely on the shooting down into it of axis-cylinders from the proximal or central segment. They have shown conclusively that it contains within itself, in its power of producing neurolemma cells, the ability to form neuroblasts and fresh axis-cylinders.

Leo Loeb (*American Medicine,* 1903) records the results of experiments showing the influence of heat upon pieces of sarco-carcinomatous tissue as affecting growth after transplantation. The power of transplanted pieces to produce tumors was weakened or destroyed by heating to 45 degrees C. for thirty minutes. Transplantations were made in white rats by excised pieces in bulk or by injections of minced tumor tissue in normal salt solution. The author proves experimentally that different tumors of similar structure may have a very different faculty to infect other tissues by mere contact.

"Theories of the Parasitic Origin of Cancer" is the subject of an article by Roger Williams in *Twentieth Century Practitioner,* 1903. The author propounds the question, "Do cancers and other neoplasms arise through a modification of formative processes, or are they the outcome of an inflammatory process due to the intrusion of microorganisms or other irritants from the outside?" He discusses the various theories, including microbic, bacterial, protozoal, and those based upon contagion and infection, and

reaches the following conclusions: (1) There is slight evidence of the contagious or infectious nature of malignant disease. (2) There are no facts to support the theory of a specific cancer microbe. (3) If malignant growths are the result of external irritants, the nature of the latter has not yet been determined.

W. B. Coley (*Trans. Am. Surg. Assn.*) discusses "The Influence of the X-ray Upon Different Varieties of Sarcoma," especially those of the axilla, pectoral region and neck. The result has been total disappearance of growth and no recurrence. His conclusions are: (1) That the X-rays exert an inhibitory action on all forms of malignant disease, especially sarcoma. (2) That inoperable growths (sarcoma) may entirely disappear under the X-rays, often without breaking down of tissue. (3) That the question of recurrence is not yet decided. (4) That the field of effectiveness of X-rays is much larger than heretofore supposed. (5) That the X-rays have the remarkable effect of relieving pain in nearly all types of malignant tumors.

On motion, adjourned to 7:30 o'clock.

SECOND DAY—EVENING SESSION.

The evening session was called to order by the President at 8:30 o'clock.

Reading of the minutes was dispensed with.

The following resolution was reported by the Chairman of the Executive Council regarding Dr. Brophy and the F. D. I.

WHEREAS, Some misunderstanding has arisen in regard to the action of the delegates of this Association to the F. D. I., and numerous reflections upon one of our representatives have been circulated, your Executive Council desires to propose the following resolution:

Resolved, That after a thorough examination of events and papers your Executive Council recommends that Dr. Truman W. Brophy be exonerated from any unjust or disloyal action at the aforesaid meeting.

Presented by B. HOLLY SMITH.

On motion, resolution was adopted.

On motion, the regular order of business was suspended while the Secretary read the following resolution regarding the preservation of the Dental Protective Association, which, on motion, was adopted.

In view of the fact that some definite action must be taken by the profession at large in the United States to preserve the present Dental Protective Association, or organize some association which will be on a more permanent basis, having interests which this Association does not possess, be it

Resolved, That Dr. J. N. Crouse, Chairman of the Dental Protective Association, be authorized and instructed to take such steps as are necessary in his judgment, and with the counsel of such of the profession as he may associate with him in this movement, to organize an association which will meet the requirements necessary to make it permanent, and as far as possible unite all the profession in this one organization, on the lines outlined by him in this meeting, and with such other conditions as seem wise to adopt after due consideration. In so instructing the Chairman of the Dental Protective Association, we do so with the full belief that with his long experience in this work he is more competent than any other man in the profession to make such an organization as is desirable and absolutely important to our existence, without being annoyed from time to time with impositions and abuses which such an association prevents.

In offering this resolution, we do so with the full confidence and belief that everything that may be undertaken and managed by him will be done honestly and for the best interests of all concerned.

Dr. C. Edmund Kells, Jr., of New Orleans, presented a paper entitled "The Removal of Impacted Third Molars," and stereopticon demonstration of X-ray work in dentistry, which was discussed by Drs. T. P. Hinman, L. E. Custer, J. P. Corley, and closed by the essayist.

Dr. Hart J. Goslee, Chairman of Section 1, then presented his report.

Report of Chairman of Section I.

A more or less careful perusal of the literature upon the subjects embraced in this Section, during the past year, enables me to report that there have appeared in the various journals something in the neighborhood of seventy original articles, the scientific and practical value of which warrant me in believing and in affirming that the progress of the present year has been quite in keeping with that of the preceding like period.

Yet of all of these various articles, constituting as they do a veritable school of practical education, and furnishing a fund of collateral information of intrinsic importance and value, but few if

any seem to indicate any special or particular trend of thought which would seem to warrant succinct or elaborate elucidation in this report. Practically every phase of prosthetic dentistry has been presented and discussed, and if there is any favorable criticism which might be justly made, it is perhaps that of the renewed and increased consideration which this particular branch of dentistry is now receiving.

The scientific articulation and occlusion of artificial teeth; the philosophy of the retention of dentures; the abandonment of the use of vegetable compounds for bases, and the peculiar characteristics and scientific management of plaster of Paris, have each received renewed and even more enthusiastic and energetic attention. While this latter subject in particular is by no means a new one, still the more recent experiments with this substance would seem to indicate a great development along the line of its proper manipulation, and also possibly the near solution of a means for overcoming the former difficulties incident to its use. Crown and bridge work has received liberal attention in a splendid array of comprehensive and well illustrated articles, embracing innumerable methods of variable merit and practicability.

The application of the ceramic art, or of porcelain work, continues to be an attractive feature of our literature, and to indicate the possibilities for higher artistic attainments. Many practical and valuable contributions have appeared, and it is both interesting and commendable to note that the tendency now seems to be less enthusiastic and radical, and more conservative in connection with the possibilities for and limitations of this work.

The specialty of orthodontia has also received its share of attention, and a splendid series of articles of both scientific and practical value has appeared. The Society of Orthodontists has doubtless contributed much to stimulate and encourage work along this line, and should be accorded due credit for its efforts. A more complete report on the literature pertaining to this subject will be read by the Secretary.

Chemistry and metallurgy have each also received some consideration, sufficient at least to indicate to us that the thinkers and workers in this line have also contributed to our progress and well-being, though perhaps nothing of very startling importance or significance has appeared to reflect special credit, or to incite any particular dis-

cussion, criticism, or commendation, as compared with the efforts of the immediately preceding periods.

In conclusion, the Section is pleased to report and offer the program which has been prepared, and to further call your particular attention to the character of the essays which are to be presented at this meeting, as being indicative of the tendencies of the present time toward the elevation of the field of dental prosthesis, and toward a higher appreciation and recognition of the true scope of its possibilities and usefulness in modern practice.

Dr. C. L. Alexander of Charlotte, N. C., read a paper on "Porcelain Inlays in Combination with Cast Fillings," which was discussed by Drs. Robin Adair, W. V-B. Ames, H. H. Johnson, and J. S. Betts, the essayist closing the discussion.

The paper by Dr. C. N. Peirce on "Evolution of Teeth" was presented by title and directed printed.

Dr. R. C. Brophy of Chicago then read a paper on "A Plea for the Abandonment of the Use of Vulcanite for Base Plates."

On motion, the Association adjourned to 9:30 a. m.

THIRD DAY—MORNING SESSION.

The morning session was called to order by the President at 9:50 o'clock.

Minutes of the preceding day were read and approved.

The Chairman of the Executive Council reported as the program of the morning session the discussion of Dr. R. C. Brophy's paper, which was read the previous evening.

The election of officers was made a special order of business for 11 o'clock; the discussion of the proposed new constitution and by-laws presented by Dr. Black two years ago to follow. A motion to limit discussions to five minutes for each member was adopted.

Dr. Brophy's paper was discussed by Drs. J. Y. Crawford, G. H. Wilson, S. J. Spence, T. W. Brophy, B. H. Teague, and J. D. Patterson. Discussion was closed by the essayist.

Dr. Richard Grady read a report on Oral Hygiene, and on motion of Dr. G. V. I. Brown it was directed that a copy of this report be sent to Dr. W. D. Miller of Berlin, Chairman of the Department of Oral Hygiene of the F. D. I., requesting cooperation of the Association. The report was on motion accepted and directed published. It

was also directed that the Publication Committee be empowered to print the report and send to all superintendents of schools and others interested in education.

Report of the Committee on Oral Hygiene.

Your committee on Oral Hygiene in Public Schools hereby makes its third annual report. Its work is patriotic and national in scope, and its mission is of prime importance, as it is earnestly striving to make instruction in oral hygiene an essential part of public school education to millions of children, over twenty per cent of the entire population, by promise a nation within a nation, and the great republic of to-morrow. "Whatever we wish to see introduced into the life of a nation must first be introduced into its schools." Think of the immense possibilities of power that lie waiting in the elementary lessons of childhood.

Everything should be done to convince the people that the care of the oral cavity is absolutely necessary to the conservation of health. "Civilized peoples remove the accumulations of waste and foreign debris from other portions of the body, but often neglect so important a part as the mouth. They blow their noses, they swab their ears, they wipe their eyes, they manicure their fingers and pedicure their toes, they shampoo their scalps, they bathe their skin, they wash and perfume their armpits, they soak and soap their feet, yet they let their mouths go uncleansed."

Educational reforms originate outside the teaching profession. To outside influence is due the inclusion of manual training in the public school system, and the same may be said of public kindergartens, and the introduction of drawing into the schools of this country by the influence of manufacturers and business men. It is therefore not empty rhetoric to speak of the obligation laid upon us, the dentists represented by this National Dental Association, to have the school authorities extend instruction in the principal law of hygiene to the domain of the mouth and teeth. Account yourselves happy that it is your lot to espouse so noble a cause in the beginning, to stand by its cradle, to see and to help it grow. Quoting Dr. Corley, "The difficulty of the undertaking is surpassed only by its possibilities." The medical profession counts as

its greatest triumph the discovery that disease may be prevented as well as cured. The introduction of hygienic physiology into public schools has done more than any other agency to bring such knowledge into the home life of the people, and to change their thinking and their habits.

The tentative plan adopted at our first meeting was communicated to state and local societies and received with favor. "A wholesome move," in the words of the *Pacific Dental Gazette,* "and coming from the fountain head it will accomplish much." With the supporting influence of this Association (for in the words of Daniel Webster, "There are many objects of great value to man which cannot be attained by unconnected individuals") and mutual cooperation with school boards, we would inculcate in children the virtue of mouth-cleanliness and teach them hygienic habits which will stand them in good stead their whole lives long. Young minds are very susceptible, and they would readily understand, if properly taught, the serious results liable to follow the neglect of their teeth. Perhaps nothing will so hasten the time when body and mind will both be adequately cared for as the diffusion of the belief that the preservation of health is a duty.

General knowledge of the causes of dental caries and the means of preserving the teeth by regular care ought to form a part of the teaching of hygiene to school boys and girls. The subject of oral hygiene should be so graded as to teach simply facts which the child may comprehend. "I am firmly convinced," said Dr. Jacobi of New York recently in a lecture on physiology and hygiene as taught in the public schools, "that the rules for the preservation of health, which teachers should be directed to communicate to their classes, could be put in a tract of seven or eight pages."

The importance of keeping the teeth clean cannot be too strongly impressed unon the mind of every individual, and Dr. Cunningham lays stress upon the tooth-brush, which "is mightier than the dentist." "When the teeth are kept literally clean," says Dr. Parmley, "no disease will ever be perceptible. Their structures will equally stand the summer's sun and winter's cold, the changes of climate, the variation of diet, and even diseases." Any attempt to increase the knowledge of the nature of the teeth and to promote a proper care for them among children is a move in the right direction. As soon as we as a national organization, and in our state and local

societies, commence to give knowledge that is of benefit to the public, they will view our efforts in a liberal way and will see that our work is for the good of mankind.

Text-books on oral hygiene have been prepared for the Mississippi Dental Association by Dr. W. O. Talbot, and for the District of Columbia Dental Society by Dr. H. C. Thompson and others. Dr. Samuel A. Hopkins of Massachusetts has published "A simple course of prevention that may be useful to the dentist, to the physician, and to the individual." Dr. R. D. Jones of Michigan has prepared "Your Teeth and Your Breath, a treatise upon how to have strong, regular teeth and a pure breath, together with the causes, results and remedies for defective teeth and foul breath." The latter was submitted in response to a resolution adopted by this Association in 1901, and includes about 125 pages. Your committee is not prepared to ask the Association to adopt that work, but recommends that the resolution, which reads as follows, be continued in force—"*Resolved,* that the president be authorized to enter into an agreement with some person or persons qualified to write a short treatise on oral hygiene, on the basis of paying a definite sum for services if the production should not be accepted, and a further amount if the work should be adopted by this National Dental Association, and that —— dollars be appropriated for the purpose."

It is inconceivable to some minds that men who are really competent will devote time to dental inspections which do not promise a money return, and as no fee is paid they think they have clear proof of base motives for the undertaking that they are only means of advertisement for the dentists. This suspicion proves only that those who make such statements are absolutely incapable of comprehending the importance of such researches. Nevertheless dentists must work to demonstrate to the public authorities the utility of protecting the health of the people. The engineer may disregard the red flag, still it pays to raise it and it may be criminal not to do so. Victor Hugo says, "The great enemy of the night is the morning." "To every man his work."

Systematic examinations of the teeth of children from 6 to 15 years of age have been made on blanks, provided by this Association, and reported to the secretary of this committee by

Dr. T. P. Hyatt, New York, 560 children.

Drs. Merrill and Fogg, Maine, 122 children.

Dr. Habeggar, Pennsylvania, 368 children.

Drs. Nesbit, Allen, Rivers, Talbot, Libby, Mississippi, 385 children.

Through Dr. W. A. Johnson, Illinois, 3,652 children.

Through Dr. N. S. Hoff, Michigan, 280 children.

Through Drs. Stiff and Steele, Virginia, 1,173 children.

Of a certain number examined 53 per cent did not use tooth-brushes, and only 37 per cent used a brush daily. For every tooth filled more than six unfilled cavities in permanent and temporary teeth were found. Only 65 out of 1,173 children examined in Richmond had no defective teeth, which confirms published statements that a systematic examination of the teeth at home and abroad reveals the fact that from 92 to 95 per cent are defective.

The writings and addresses of professional men on the subject of oral hygiene are familiar to you as readers of dental journals, but we cannot refrain from inviting your attention to one of the classics on oral hygiene read at the last meeting of the Southern Branch of this Association by Dr. J. P. Corley of Alabama, the paper by Dr. Alphonso Irwin of New Jersey on "Public Dental Service," and the main points of a conversation with a new patient who asks how to care for the teeth by Dr. E. A. Bogue of New York. We know of no papers in which the subject is treated with more judgment.

Public schools, as we know, are made use of for the dissemination of hygienic knowledge. The instruction in oral hygiene leaves much to be desired, judging from these quotations from text-books—"Tartar affects the saliva and makes food hard to digest;" "a few drops of cologne or oil of rose may be added to lime water as a mouth wash if the taste is unpleasant;" "all amalgams, pastes and other cheap articles should be rejected both for the sake of the teeth and general health;" "to clean the teeth employ powdered charcoal;" "the enamel of the teeth may be injured by breathing very cold air through the mouth;" "when cavities have formed in the teeth the dentist fills them with silver foil;" "hot as well as cold water may crack the enamel;" "in smoking there are very sudden changes of the temperature of the air in contact with the teeth and for the same reason this must injure them;" "when we are six years of age the milk teeth begin to decay and the second gradually take their place." Dr. Hoffen, quoting from the text-book used in Chicago—"The prevention of tartar fungus (is it possible Drs. Black

and Miller have overlooked this one?) is best effected by the use of a weak solution of carbolic acid"—says, "I have had patients from the high school say they didn't see why they had that tartar on the teeth, as they used plenty of carbolic acid." Such teaching is mischievous, and dentists should denounce it. They must continuously, indefatigably, pointedly set the truth before pupils and teachers and parents.

There is real need for a committee on oral hygiene in every dental organization, and if the only thing done by the National Association has been to attract the attention of the authorities and the public to the importance of the hygiene of the mouth, it has meant a great advance. It seems hardly credible that such a movement, having for its only object the promotion of the health and happiness of the race, should be received anywhere with apathy, much less opposition, but that it has been so received adds but another argument in its favor and accentuates anew the prevailing ignorance upon this subject. One of the most unfair and prejudiced arguments from a member of an unsympathetic school board was: "The method would make the public schools unpopular. The movement would not be tolerated by the Johns Hopkins' University and Woman's College, hence why should the poor because of this necessity be subjected to anything they would resist were it in their power? By what authority does the school board order such an examination other than that it would affect the health of the neighborhood pupils by infection?" In striking contrast is the following report of Dr. Frank W. Stiff:

"From California Dr. C. Diechmiller reported that he had been unable so far to obtain permission from the political school board of San Francisco to go into the schools, but hoped in the near future to be able to do so, and asked for suggestions and 'terse, pointed literature.' In the hope that our experience in Richmond may help others in college towns, I will repeat substantially what I wrote him. The unanimous endorsement of the movement was first secured from the local dental society, and a committee was appointed to appear before the school board for permission to make the examinations. Knowing how jealous school authorities are of the time of teacher and pupil, we were careful to impress upon the board that we would not consume any appreciable time nor would the work entail any cost to them. We simply asked for a room and

that the children be sent us four or five at a time for five minutes. As each child was examined another would take its place, the one examined returning to the school room at once, having been absent not much longer than to get a drink of water. We represented that the movement was endorsed by the local society, many members of which were known by the board, and by this National Dental Association, the largest and most influential dental body in the world, under whose auspices the work was being done. We were also careful to allay any suspicions as to its being an advertisement of the dentists of the town. *Absolutely no objection was raised and consent was at once granted.* Our next difficulty was to get the dentists to do the work, as few were willing to give the time necessary. It was finally concluded to enlist the interest and cooperation of the senior classes in the colleges. This was readily done and two students were taken to each school and instructed how to make the examinations and fill the forms. I desire particularly to note that in my visitation of the schools, both as a member of the school board and to instruct the students in their work of examination, I have found absolutely no opposition on the part of teacher, scholar or parent. So far as I have been informed, no child has refused to be examined for any reason. The school authorities are greatly interested and are aiding us all they can in our work. One of the most progressive principals asked for a manual on oral hygiene, a 'tooth drill' he called it, for use by his teachers, and the principal of the high school, who was present when I was reminded of my promise to secure this aid, volunteered to have the matter typewritten and sent to all the principals for general use in the city. We will without doubt finish the schools of Richmond the coming term."

Helpful suggestions are solicited by the committee in the discussion of its report. Some have come to us which we commend to members for use by their state and local societies. Oneness of aim does not imply indentity of means. In the words of the code of ethics, "Educate the public mind," with fresh zest and vigor.

> "Man must be taught as though you taught him not,
> And things unknown proposed as things forgot."

1. Bring the matter before the public by using the press, as suggested by Dr. L. P. Bethel.

2. Circulate rules for the preservation of the teeth of school children, as the British Dental Association has done.

3. Establish campaigns of education by public lectures, as has been done by the Alabama Dental Association.

4. Issue a pamphlet on the care of the teeth, as a California dental society has done.

5. Do as in Maryland, have medical and public associations, by resolutions, recognize the benefits of oral hygiene, and approve the efforts to give instructions to pupils of public schools on the care of the mouth and teeth; also donate tooth-brushes to fresh air societies to inculcate ideas of cleanliness.

6. Read the papers of Dr. Frank Allport in the *Review of Reviews,* the *Educational Review* and elsewhere, advocating systematic examination of the eyes and ears, which have influenced school authorities.

7. Until we have popular education on the care of the teeth do missionary work on your individual responsibility.

8. Let the dental colleges organize emergency corps, after the typical one at the Harvard University dental department.

9. Show the necessity for dental services to public institutions, which receive often unskilled service.

10. Speak out in meeting in the line of Dr. C. N. Johnson: "There has been a request from the National Association with regard to dental hygiene in the schools. I have the greatest desire to see our public schools, in the great cities especially, gone through with care by someone who is willing to devote a little time without the expectation of a fee, for the purpose of seeing what may be discovered—the accumulation of data that may be found through such circumstances. I have the greatest desire in my heart to do something to stop the ravages which we see in the mouths of young children. We see their beautiful teeth with not as yet the least sign of dental caries, but we see in our mind's eye five or ten years from that time a mouth full of a great mass of dental work. If we could only do the work our profession would win the greatest appreciation from the public at large. I want to see something more done in that line, and to see every member of my society and of the profession insisting upon the proper cleanliness and care of the mouths of our children."

In conclusion, the committee asks to be continued in its present

membership or by change of members, with authority to draw upon the treasury for future work, and to be known hereafter as "The Committee on Oral Hygiene in Public Schools and Institutions." We invite the cordial assistance of every officer and member. The cause is worthy, the work is ours.

Committee { RICHARD GRADY, Chairman.
F. W. STIFF, Secretary.
H. H. JOHNSON.
I. P. WILSON,
L. ASHLEY FAUGHT. }

On motion by Dr. J. P. Corley, it was ordered that a copy of resolution, to the effect that it is the sense of the N. D. A. that dental pathology and prophylaxis should be taught in all medical schools, be sent to such bodies, and a committee consisting of Drs. F. W. Stiff, R. Grady and W. E. Walker was appointed to communicate with the deans of all medical colleges.

"Be it Resolved, That it is the sense of the National Dental Association that each medical college in the United States should include in its curriculum a lectureship on oral hygiene and dental prophylaxis and dental pathology.

"Resolved, That a Committee be appointed to communicate this action to the deans of the medical colleges in the United States and to secure its publication in the medical journals of the country."

At eleven o'clock the Association went into session for the election of officers. Drs. C. S. Butler, S. W. Foster and C. N. Thompson were appointed as tellers. The election resulted in the selection of Dr. C. C. Chittenden of Madison, Wis., President; Dr. Harry P. Carlton of San Francisco, Vice-President for the West; Dr. Waldo E. Boardman of Boston, Vice-president for the East, and Dr. J. G. Fife of Texas, Vice-president for the South; Dr. C. S. Butler of Buffalo, Corresponding Secretary; Dr. A. H. Peck of Chicago, Recording Secretary; Dr. V. E. Turner of Raleigh, N. C., Treasurer; Drs. C. N. Johnson of Chicago, V. H. Jackson of New York, and T. P. Hinman of Atlanta, Members of Executive Committee; Drs. H. J. Burkhart, Batavia, New York; B. Holly Smith, Baltimore; J. Y. Crawford, Nashville; M. F. Finley, Washington, and Chas. McManus, Hartford, Conn., Executive Council.

On motion, a resolution proposed last year was laid on the table.

On motion, the Association adjourned to meet at 7:30 p. m.

THIRD DAY—EVENING SESSION.

The evening session was called to order by the President at 8:30 o'clock.

Dr. H. J. Burkhart read a recommendation from the Executive Council to the effect that the work of the Association next year be limited to the election of officers and other necessary business; the scientific part of the program to be merged with the International Congress. On motion, this recommendation was adopted.

Dr. G. V. Black made a report of the Committee on Revision of Constitution and By-Laws, which was discussed by Drs. J. N. Crouse, J. D. Patterson, M. L. Rhein, C. S. Butler, J. A. Libbey, J. Taft, L. C. Leroy, F. B. Noyes, Garrett Newkirk and R. Grady. The discussion was closed by Dr. Black. On motion, the report was adopted, which included the adoption of the revised constitution and by-laws presented by Dr. Black.

Dr. C. N. Peirce read the report of the Committee on President's Address. On motion the report was accepted as recommended, and committees were directed appointed.

COMMITTEE'S REPORT ON THE PRESIDENT'S ADDRESS.

Your Committee, to whom was referred the President's Address, make the following report upon that interesting communication. The statement regarding membership is certainly worthy of note—the total estimate of the whole number of dentists in the United States approaching 28,000, while of these not over 10,000 would be eligible to membership in this Association, is certainly much to be regretted and indicates that our educational institutions have much work before them.

The recommendation regarding the time of meeting is one of interest to every member, and while the subject has been before the Association repeatedly, there seems to be no other season of the year that would accommodate so great a number as the months of July or August.

The revision of the constitution as recommended in Dr. Black's address in Milwaukee is in the hands of a committee at this time,

and when a final report is made it is to be hoped that satisfactory conditions will be reached.

Regarding the branches suggested by the President, your Committee feel that it would be a division of our strength that would lessen the influence of the Association without in any way adding to its efficiency. If, however, the Society should deem that a report from a special committee would be of importance your Committee would concur in such action.

The recommendation that the Association should own a journal and publish their proceedings, as is now done by the medical associations, is certainly worthy of serious consideration, and may be presented with advantage by reference to a special committee for future report.

With regard to the International Congress, which has been a matter of much interest, your Committee is happy to state that congratulations are certainly in vogue that the matter has been so satisfactorily adjusted and that the Committee through Dr. Cryer extended an invitation to the British Dental Association, Brighton, England, and it was accepted, so that we are to have as our guests at the approaching Congress the representatives of that large and important scientific body.

The recommendation of the President for the benefit of our aged and invalid members is worthy of his generous heart, and should certainly be referred to a committee that the Association may have the result of a very carefully prepared report on this important subject.

In conclusion, the Committee recommend the publication of the President's address in its proceedings.

Respectfully submitted,

Committee { C. N. Peirce, Garrett Newkirk, J. G. Fife.

Dr. A. J. Flanagan, Chairman of Section II, then read his report.

Report of Chairman of Section II.

The interest and thought during the past year in dental education, literature, nomenclature, histology, and microscopy have added greatly to the knowledge in general, but in the branch of dental

education it seems we have most marked thought and advancement. We will never have this subject of education solved, and it is well that such is a fact, for the solving of the same in its entirety would surely mean stagnation. The National Association of Dental Faculties and the National Association of Dental Examiners can safely be allowed to guide thought and action in the future in their respective lines, for each body has now demonstrated its worth to American dentistry, and that in no uncertain manner. The International Dental Federation has been the means of correcting many false ideas held by foreigners relative to American ideals in education. A greater interest in this Federation by American institutions will only add to the universal truth. The address delivered at Stockholm last August by President Brophy of the International Commission of Education was noteworthy and is well worth a thorough study.

It is pleasing to note that the granting of preliminary requirement certificates by state regents or educators, rather than by dental college professors, is steadily on the increase. The granting of such certificates by state officials is a way to honest preliminaries. There seems to be a complaint by certain short-sighted practitioners of dentistry that our preliminary requirements and the standard of professional attainment do not compare favorably with those of medicine. Is this an error? It seems to us that an honest opinion from men qualified to judge cannot be unfavorable to our calling. There are far too many idle thoughts and words along these lines. The extra year added to our course in dental education means higher ideals and results, but it is only indicative of the progression in our calling A thinker might say, Does not this mean, above all, better technique for the future?

The recognition of the dental degree by the American Medical Association means a recognition of worth in quarters long blinded to tradition. Dr. Talbot's article in several dental journals for this month should be read with interest; also the editorial in the July *International* on the "Recognition of the D. D. S. degree by the American Medical Association." "Qualifications for Practice," by Arthur Holbrook of Milwaukee, and "The College Man," by C. L. Goddard of San Francisco, are two articles that have attracted thought and discussion this last year. The two editorials under the same heading by Dr. Kirk in the *Cosmos* have attracted even greater

discussion, and deal with the points at issue in a clear and logical manner.

Dental literature has been well represented this last year as regards quantity; the representation by quality may be questioned. It can no longer be said of dentistry that we have not a plentiful supply of distinct literature. The following may be mentioned as worthy examples of the best in this year's productions: "Nutrition, Rickets, and Dental Defects," by Dr. J. K. Kingston of England; "Success in Dental Practice," by Dr. C. N. Johnson of Chicago; "The Filling of Teeth with Porcelain," by Dr. W. W. Bruck of Breslau; the second edition of Dr. I. N. Broomell's "Anatomy and Histology of the Mouth and Teeth;" "The Care of the Teeth," by Dr. S. A. Hopkins of Boston; the second edition of "A Manual of the Injuries and Surgical Diseases of the Face, Mouth, and Jaws," by Dr. J. S. Marshall.

"A Contribution to the Study of Metabolism," by Dr. E. C. Kirk is worthy to be classed and read in conjunction with the study put forth lately by Dr. W. D. Miller of Berlin, entitled "Introduction to the Study of Immunity in Its Relation to the Diseases of the Mouth and Teeth."

The only addition to nomenclature this last year that I have been able to find was put forth by Dr. D. R. Stubblefield and was used by him as the title to a worthy paper presented before the Massachusetts Dental Society. The word was "Sanitology," and a study of the paper by practitioners of either dentistry or medicine may bring forth the thought that it is a worthy addition to nomenclature.

Histology and microscopy have brought forth few contributions to the science of dentistry this last year. One of the greatest needs of dentistry at the present time is original investigation in this line, and this National Association can do no greater good than to take steps to stimulate same. The most difficult essays to secure for this society are now and always have been found under the section devoted to these subjects. Hours of correspondence this year failed to bring forth anything under these headings. Writings worthy of study that have been brought forth this last year are: "The Leptothrix of the Mouth," a micro-histological study, by Drs. Leon Frey and Georges Lamerle of Paris; "Ductless Glands," by Dr. C. E. de M. Sajous of Philadelphia; "The Question of the Transparency of the Dentin," by Dr. W. D. Miller of Berlin; last but not least, "The

Predisposing Factor in Dental Caries," and "The Structural Characteristics of the Calcified Dental Tissues as Related to the Question of So-called 'Hard' and 'Soft' Teeth," by Dr. E. C. Kirk. It seems that if our Association would offer certain pecuniary inducements each year histologists and microscopists would present investigations of real worth to the profession. Only those intimately connected with such work can appreciate the personal financial cost to those who carry on such investigations.

As the result of thorough canvassing on the part of your committee—assisted by the personal work of our worthy President—we have three papers for this section: "Dental Education," by Dr. Sheppard W. Foster of Atlanta; (a) "Co-Education in Our Dental Colleges, and, (b) Is Dentistry a Suitable Calling (or Profession) for Women?" by Dr. J. A. Chapple of Atlanta; and "The Progress of Dental Education," by Dr. J. P. Gray of Nashville.

Dr. J. A. Chapple of Atlanta read his paper on "Co-education in Our Dental Colleges, and Is Dentistry a Suitable Calling for Women?" The discussion was opened by Dr. H. A. Smith and continued by Drs. J. Taft, G. Newkirk, and C. V. Vignes. The discussion was closed by the essayist.

Dr. S. W. Foster of Atlanta read a paper on "Conservatism in Dental Education," which was discussed by Drs. J. Taft, M. S. Merchant, C. W. Rodgers, E. A. Bryant, S. H. Guilford. T. W. Brophy, G. Newkirk, F. B. Noyes, H. E. Roberts and H. B. Tileston. The essayist closed the discussion.

On motion, the Association adjourned to meet at 9:30 Friday morning.

FOURTH DAY—MORNING SESSION.

The morning session was called to order by the President at ten o'clock.

Minutes of preceding day were read and approved.

A resolution was offered by Dr. Richard Grady in regard to interchange of licenses, and was adopted.

WHEREAS, A system of interchange of licenses has been made effective between the dental examining boards of New York and Pennsylvania; and

WHEREAS, It is published that the medical boards of Indiana, Ohio, Kansas, Wisconsin, Iowa and Michigan have finally effected an agreement by

which physicians who have passed an examination in one of the states may practice in any one of the six without further examination;

Therefore, be it *Resolved,* That this National Dental Association, recognizing these practical realizations of interstate reciprocity, and believing that they should serve as a stimulus to an extension of the movement. indulges the hope that, as a result of conferences, other dental examining boards may be both inclined and enabled to secure to the licensees of one state the right to engage in practice in another state without passing an examination. This reciprocity should apply only to dentists eligible to membership in this body.

Resolution in regard to delegates to the F. D. I., to be held in St. Louis in 1904, adopted on motion:

Resolved, That five delegates be appointed by the President, with authority to represent this Association at the meeting of the Federation Dentaire Internationale, which is to be held in St. Louis in connection with the Fourth International Dental Congress in 1904.

And further be it Resolved, That these delgates be and are hereby instructed to limit the affiliation and cooperation of the National Dental Association of America in the policy and work of the Federation Dentaire Internationale strictly within the lines of an international advisory council.

E. C. Kirk, Chairman.
L. G. Noel.
J. A. Libbey.
Garrett Newkirk.
G. V. I. Brown.

A resolution was offered that the sum of $500.00 be appropriated to the treasury of the Congress Committee, and was adopted.

Committee to consider establishment of a journal, as recommended by President in address, to consist of Drs. James Truman, M. L. Rhein, and R. H. Hofheinz.

Committee on aged and infirm members, S. H. Guilford, H. H. Johnson and C. P. Pruyn.

The Executive Council recommended that The Dental Digest be given the proceedings to publish on the same conditions as heretofore. Adopted.

A paper by Dr. N. C. Leonard of Nashville, on "Adhesion vs. Atmospheric Pressure in the Retention of Dentures" was read, and discussed by Drs. S. H. Guilford, D. D. Smith, J. D. Patterson, W. V-B. Ames, B. H. Teague, M. S. Merchant, and E. A. Bogue. The discussion was closed by essayist.

On motion, it was directed that the proceedings of the Southern Branch for 1904 be published with those of the N. D. A. for 1903, provided said meeting of the Southern Branch is held before Febru-

ary 24, 1904, and provided further that its proceedings are placed in the hands of the publishers not later than sixty days after the close of said Southern Branch meeting.

Moved that Dr. Marshall's paper be read by title and published. Carried.

A vote of thanks was extended to all who participated in the entertainment of the Association, and the Secretary was directed to communicate with the respective persons.

Dr. C. C. Chittenden, the newly-elected President, was installed.

The new President appointed as delegates to the F. D. I., 1904, Dr. H. J. Burkhart, Chairman, E. C. Kirk, L. G. Noel, J. A. Libbey, Garrett Newkirk, G. V. I. Brown, J. Y. Crawford, A. H. Peck.

On motion, the Association adjourned.

A. H. PECK, Recording Secretary.

Minutes of the Executive Council.

First meeting called to order by Dr. H. J. Burkhart, Chairman, in committee room of Battery Park Hotel, at 10:45 o'clock, July 28, 1903.

Dr. M. L. Rhein addressed the Council on the subject of the publication of the transactions.

The program as published in pamphlet form was presented as the official program for the meeting, and on motion was adopted.

The Secretary presented his annual report.

Annual Report of Recording Secretary.

To the Executive Council of the National Dental Association.

GENTLEMEN:—Your Recording Secretary respectfully submits the following report:

A faithful and accurate record of the minutes of the last meeting was kept.

In accordance with a resolution adopted at the last meeting, to the effect that the Chairmen of the Sections and Recording Secretary shall constitute the Program Committee, your Secretary gathered the material from the various sections, arranged it, and published the program which was mailed Friday, July 3.

Circular letters regarding the proposed International Congress have been published and mailed to the members by direction of Dr. H. J. Burkhart, Chairman of the Committee on Organization.

Also further circular letters of a general nature regarding the present meeting, by direction of Dr. J. D. Patterson, Chairman of the Executive Committee.

Respectfully submitted,

A. H. PECK, *Rec. Secy.*

The Secretary then presented the report of the Publication Committee.

Annual Report of the Publication Committee.

The Publication Committee respectfully submits the following report:

In accordance with a vote of the Executive Council, Dr. J. N. Crouse,

publisher of the DENTAL DIGEST, was accorded the transactions for publication.

The transactions were mailed June 9. After the usual distribution to members, journals, libraries, etc., there are about one hundred copies still on hand. A. H. PECK, *Chairman.*

The Council adjourned to meet at 7:30 p. m.

The evening session was called to order by Dr. H. J. Burkhart at 7:45 o'clock.

The minutes of the previous meeting were read and approved.

The Chairman then read a communication from Dr. William H. Chambers, representing the dentists of the Army and Navy corps.

The communication was accepted, and, on motion, the courtesies of the floor were recommended extended to Dr. Chambers.

The report of Section III was read.

Report of Section III.

Section III was called to order by the Secretary, July 28, 1903, at 3:15 p. m. Dr. J. I. Hart was elected chairman pro tem in the absence of the Chairman. The Section listened to the reading of the papers presented, and recommended the following papers to be read before the general assembly: "The Preparation of Cavities for Inlays," by Dr. C. N. Thompson, Chicago; "The Effect of Inlay Fillings on Modern Dentistry," by Dr. Joseph Head, Philadelphia; "The Preparation of Cavities and the Use of Pins in Porcelain Inlays," by Dr. T. P. Hinman, Atlanta, Ga.

The Section then elected the following officers for the ensuing year: Chairman, Dr. John I. Hart, New York; Secretary, Dr. T. P. Hinman, Atlanta, Ga. J. I. HART, *Chairman pro tem.*

On motion, the report was adopted.

On motion, the Council adjourned to meet at 8:30 o'clock Wednesday morning.

Wednesday morning meeting was called to order by Dr. H. J. Burkhart, Chairman, at 9 o'clock.

Minutes of the previous meeting were read and approved.

Dr. G. V. Black requested that a time be fixed for the consideration by the main body of the new constitution and by-laws.

On motion, the Council adjourned to meet at 10 o'clock.

The adjourned meeting was called to order by the Chairman at 10 o'clock.

The advisability of the Association conducting an official organ was taken up for consideration.

The Secretary read the following communication from some of the officers and stockholders of the *International Dental Journal*:

The undersigned stockholders and officers of the *International Dental Journal* present at the sixth annual meeting of the National Dental Association held at Asheville, respectfully suggest that a committee be appointed from the National Association with power to act, to confer with the Board of Managers of the *International Dental Journal*, with a view to arranging terms upon which this journal may be transferred to the National Association as its organ.

The journal is practically self-supporting. It has no debts of any kind save what it can pay with money already in hand. The past sixteen years or thereabouts it has been conducted in a strictly professional and ethical manner.

JAMES TRUMAN,
E. A. BOGUE,
EUGENE H. SMITH,
WILLIAM H. POTTER,
V. H. JACKSON,
WILLIAM CARR,
E. S. GAYLORD,
C. N. PEIRCE,
JAS. MCMANUS,
CHAS. MCMANUS.

The subject was discussed by Drs. J. N. Crouse, James Truman, E. A. Bogue, M. L. Rhein, R. Ottolengui and L. P. Bethel.

Dr. William E. Walker addressed the Council, urging that an official bulletin board be conducted.

On motion, Council adjourned to meet at 7 o'clock.

The Council was called to order by the Chairman, Dr. H. J. Burkhart, at 5:30 o'clock.

Minutes of the previous meeting were read and approved.

Dr. T. W. Brophy presented a report on behalf of the commission appointed one year ago to extend an invitation to the Stockholm meeting to hold a fourth International Dental Congress in St. Louis, 1904. On motion by Dr. J. Y. Crawford, Drs. T. W. Brophy and E. H. Smith were requested to formulate a report to be printed in the transactions.

On motion, Drs. B. Holly Smith and J. Y. Crawford were requested to draft a resolution regarding Dr. Brophy and the F. D. I., to be presented to the Council for consideration.

On motion, the Council adjourned to meet at 8:30 o'clock.

The evening meeting was called to order by the Chairman at 8 o'clock.

Dr. B. Holly Smith presented a resolution bearing on Dr. T. W. Brophy and the F. D. I.

On motion, the resolution was recommended to the main body for adoption.

The report of Section V, Dr. Thomas Fillebrown, Chairman, was called for.

Dr. W. H. G. Logan, Secretary of Section V, presented the report.

Report of Secretary of Section V.

GENTLEMEN OF THE EXECUTIVE COUNCIL:—Meeting was called to order in the absence of Chairman Thomas Fillebrown, by Secretary Wm. H. G. Logan, of the Section. Upon motion, Dr. M. L. Rhein was elected Chairman.

The following papers were read, discussed and recommended to be presented before the main body: "The Removal of Impacted Third Molars," by Dr. C. Edmund Kells, Jr.; "Tooth Development," by Dr. C. N. Peirce; "Certain Abnormal Oral Manifestations Peculiar to Tropical and Subtropical Climates, as Manifested Among the American Troops in the Philippine Islands," by Dr. John S. Marshall.

The paper by Dr. Henry J. Jaulusz, entitled "Cleft Palates, With Models Illustrating Treatment of Same," was rejected by unanimous vote of Section, and said paper placed in the hands of Secretary A. H. Peck.

Respectfully submitted,

W. H. G. LOGAN, *Secretary.*

On motion, the Council adjourned to meet at 9 o'clock.

The adjourned meeting was called to order by the Chairman, at 9 o'clock.

The following report regarding veteran members of the Association was read, and, on motion, adopted:

Resolved, That the following men be placed on the list of permanent members without dues: A. C. Hewitt, C. N. Peirce, E. B. Marshall, J. Hall Moore, A. E. Lyman,

The report of the Committee on Army and Navy Dental Legislation, Dr. M. F. Finley, Chairman, was read and, on motion, recommended for adoption.

Report of Committee on Army and Navy Dental Legislation.

To the Officers and Members of the National Dental Association:—Your Committee on Army and Navy Dental Legislation beg to report progress, believing the prospect of securing a satisfactory commissioned rank for the Military Dental Surgeon is favorable.

That an educated and efficient dental service, representative of the attainments of the profession, cannot be maintained without a commissioned personnel is practically universally conceded, and nothing less will be accepted by your Committee or your true friends in Congress.

Respectfully submitted,

M. F. Finley, *Chairman.*
Wms. Donnally, *Secretary.*
J. A. Libbey,
Chas. S. Butler,
Gordon White,
Thos. T. Moore,
Committee.

Report on Carnegie Institute, Dr. Wilbur F. Litch, Chairman, was read and, on motion, was accepted.

Report of Committee on Carnegie Institute.

To the President and Members of the National Dental Association:

Gentlemen:—The Committee on the Carnegie Institute respectfully report that they have devoted considerable attention to the consideration of measures for securing from that endowment a grant in aid of research in the science of dentistry.

In their efforts for the furtherance of this object your Committee have been confronted by the difficulty that on the part of the custodians and administrators of the endowment there is some apparent in-

disposition to give much aid to investigations in any branch of medical science, so far at least as relates to etiology, pathology or treatment of disease. This is doubtless attributable to the fact that such lines of investigation are specially provided for by the Rockefeller Institute for Medical Research. So far as your Committee are informed there has been no formal request for a grant from the Carnegie Institute thus far presented by any medical society, and the grants hitherto awarded have been almost exclusively in aid of research in what are known as the exact sciences.

Dr. Daniel C. Gilman, President of the Board of Trustees of the Carnegie Institute, in conference with a representative of your Committee, Dr. B. Holly Smith, has, however, stated that while a grant in aid of dental research had not been considered by the trustees, still, in view of the benefit to the human race of research along dental lines, an application for a grant for the prosecution of such work by a member of our profession would receive due consideration.

In addition to correspondence and conference with the officers of the Carnegie Institute, your Committee has been in correspondence with a number of those members of our profession who have been or are now engaged in original research work, but thus far no one has made formal application for a grant from the Carnegie Institute. It is probable, however, that in the near future one or more will do so.

The appointment of committees on the Carnegie Institute by several state dental societies is an index of the interest felt in the subject by the dental profession generally. These state committees are all working in harmony with the committee appointed by this Association and have been consulted freely. Dr. Henry D. Hatch, Chairman of the New York Committee, has manifested special interest in the questions at issue, and your Committee have profited greatly by his intelligent and zealous cooperation.

All who have been consulted feel that in view of the magnitude of the interests at stake the avoidance of hasty or ill-advised action is of paramount importance, and that while the needs of the profession are great and manifold it is at present better to ask for too little rather than too much.

There are several purposes for which it is generally agreed that a grant may properly be asked, either now or at some future time,

Among these may be mentioned the indexing of all extant dental literature, thus furnishing for dentistry a work of reference corresponding to the *Index Medicus.* But what all agree is chiefly needed is the establishment of a fully equipped laboratory devoted exclusively to research to be carried on by men selected for their devotion to science and proved ability as investigators.

As such work could be effectively prosecuted only at the sacrifice of other professional interests, appointments to the laboratory staff should be permanent and the salaries attached thereto sufficient for liberal maintenance. As a grant for such a laboratory can hardly be hoped for at the present time, the only remaining alternative is for such investigators as may have the desire and ability to pursue independently special lines of research in dental science, to file applications for grants in aid of their work.

If the ability of the applicant and the importance to dental science of the research upon which he desires to engage are properly attested by a committee appointed by this Association, there is every reason to believe that the application will be favorably considered by the Trustees of the Carnegie Institute.

In conclusion, we recommend that a standing committee on appropriations for research work be appointed and that the present committee be discharged. Respectfully submitted,

WILBUR F. LITCH.
B. HOLLY SMITH.

The following communication from the American Dental Society of Europe was read and, on motion, the Secretary was directed to reply in suitable form.

Wiesbaden, Germany, July 3, 1903.

To the Recording Secretary of the National Dental Association.

DEAR DOCTOR:—I am instructed by the above Society to inform your Association that its next annual meeting will be held in Hamburg, Germany, next Easter, 1904, and to extend a most cordial invitation to the members of your Association to visit us on that occasion. Allow me to express my best wishes for a most successful meeting at Asheville on the 28th inst.

I remain, fraternally yours,
CHAS. J. MONK, *Hon. Secy.*

On motion, the Council adjourned to meet at 8:45 o'clock, Thursday morning.

The Council was called to order by the Chairman, Dr. H. J. Burkhart, at 9 o'clock.

The report of Section VI was read,

Report of Chairman of Section VI.

Your Committee in making its report desires to state that the assembly room afforded splendid facilities for clinic purposes, there being windows enough to afford excellent light for chair clinics, and the floor space was used to good advantage by the large number of table clinics. The Committee desires to thank the hotel management and local committee for their assistance—chairs and tables were furnished in abundance and all necessary electric connections were provided. The clinics were of a high order, many of them entirely new. The Committee is pleased to state that only a small percentage of those advertised as clinicians failed to appear. The following clinics were given:

1. Dr. Levi C. Taylor, Hartford, Conn.—Hygienic Fillings.

2. Dr. S. Eldred Gilbert, Philadelphia.—Sharp's Seamless Crown Outfit.

3. Dr. R. C. Brophy, Chicago.—Something in Porcelain Work.

4. Dr. Garrett Newkirk, Los Angeles, Cal.—Advantages of the Hollow Post Combined with the Inlay Principle for Cantilever and Bridge Abutments.

5. Dr. D. O. M. Le Cron, St. Louis.—Modern Porcelain Art, and Oil Colors as Applied to Dental Prosthesis.

6. Dr. W. H. G. Logan, Chicago.—Pyorrhea Alveolaris.

7. Dr. G. Evans, New York.—The Cementation of Crowns and Bridges with Gutta-Percha Cement.

8. Dr. J. H. Feagan, Spartanburg, S. C.—Demonstrating the Advantages of an Improved Flask in Investing and Packing Vulcanite Dentures.

9. Dr. Edwin C. Blaisdell, Portsmouth, N. H.—The Use of Non-Cohesive Gold.

10. Dr. Russell Markwell, Galveston, Texas.—Porcelain Crown.

11. Dr. Paul W. Evans, Washington.—Specimens of Porcelain Work and a Method of Making Seamless Gold Shell Crowns.

12. Dr. Alfred Owre, Minneapolis, Minn.—Cavity Preparation in Natural Teeth.

13. Dr. Burton Lee Thorpe, St. Louis.—A Method of Protecting the Cervical Margin in Cement Fillings.

14. Dr. H. Herbert Johnson, Macon, Ga.—An Improved Modification of the Richmond Crown.

15. Dr. R. Ottolengui, New York.—Models and Appliances Representing Artificial Vela and Obturators for Cleft Palate.

16. Dr. William T. Reeves, Chicago.—Porcelain Inlays.

17. Dr. Joseph Head, Philadelphia.—Porcelain Inlays.

18. Dr. H. B. Tileston, Louisville, Ky.—Gold Inlay (Using Copper Amalgam Matrix).

19. Dr. H. P. Carlton, San Francisco.—To be announced.

20. Dr. W. A. Capon, Philadelphia.—Porcelain.

21. Dr. L. E. Custer, Dayton, Ohio.—Porcelain.

22. Dr. B. Holly Smith, Baltimore.—Some Novel Attachments for Removable Bridge and Metal Plate Work.

23. Dr. W. E. Grant, Louisville, Ky.—Abutments for Esthetic Crown and Bridgework.

24. Dr. Emory A. Bryant, Washington, D. C.—Replaceable Facings for Crown and Bridgework and Repairs.

25. Dr. Henry C. Raymond, Detroit.—Porcelain.

26. Dr. C. K. Teter, Upper Sandusky, Ohio.—Administration of Nitrous Oxid and Oxygen in Combination, and the Administration of Nitrous Oxid Through the Nasal Passages for Continuous Anesthesia.

27. Dr. Robt. E. Payne, New York.—Implantation.

28. Dr. C. L. Alexander, Charlotte, N. C.—Gold Inlays.

29. Dr. W. Clyde Davis, Lincoln, Neb.—A Method of Painless Pulp Extirpation and Painless Extraction of Teeth.

30. Dr. Gordon White, Nashville, Tenn.—Arrest of Pyorrhea by Crown and Bridgework.

31. Dr. Geo. H. Wilson, Cleveland.—Vulcanite.

32. Dr. J. D. Patterson, Kansas City, Mo.—Ideal Method of Adapting a Logan Crown.

33. Dr. W. V-B. Ames, Chicago.—Cements.

34. Dr. A. C. Hewitt, Chicago.—A New Transparent Cement.

35. Dr. B. F. Arrington, Goldsboro, N. C.—Removal of Calculus with Special Instruments.

ROBT. H. NONES, *Chairman.*
DON M. GALLIE, *Secretary.*

Dr. Richard Grady presented his report as Chairman of Committee on Oral Hygiene. He also presented resolutions on interstate reciprocity and interchange of license, which were recommended to main body for adoption.

On motion, the Council adjourned to meet at 2 o'clock p. m.

The Council was called to order by the Chairman, Dr. H. J. Burkhart, at 2 o'clock.

The subject of the publication of the transactions was taken up for consideration. Mr. Lewis, President of the S. S. White Dental Manufacturing Company, and Dr. J. N. Crouse spoke on the subject.

The Chairman, Dr. H. J. Burkhart, read a resolution concerning the N. D. A. and the F. D. I., which, on motion, was recommended for adoption.

On motion, the usual salary of the Secretary and the Treasurer was directed paid.

The Secretary read the following communication regarding Dr. I. P. Wilson, and, on motion, it was accepted:

Dr. I. P. Wilson of Burlington, Ia., has been confined to his bed since February—trouble, fatty degeneration of the heart—and is expected to pass on at any time.

He has always been active in Association work, is the oldest living member of the Iowa Society, has taught many years in Iowa colleges, and has been a true friend to young men. His perfect life and high ideals have been an inspiration to those privileged to know him. Some word of sympathy coming from the National Dental Association will be greatly appreciated and is justly due such a worthy representative of our profession.

The Secretary read the annual report of the Treasurer, and, on motion, it was adopted.

TREASURER'S REPORT.

RECEIPTS.

Balance on hand	$ 841.89	
Collections to date	1,732.00	
		$2,573.89

DISBURSEMENTS.

Navy legislation and navy committee	$ 514.55
Salary of Secretary, 1902	400.00
Expense Secretary's office	283.46
Prosecuting colleges	166.08
Official stenographer	125.00
Salary of Treasurer	100.00
Expense of Treasurer's office	36.45
A. H. Peck, expense of Secretary's office, 1903	114.11
A. H. Thompson, visit to Washington	100.00
Mailing transactions—DENTAL DIGEST	92.55
Committee on Oral Hygiene	65.12

Section III.	65.00	
Arrangement Committee	48.40	
Section V.	38.25	
Seal (B. H. Sief Jewelry Co.)	25.00	
Executive Committee	17.00	
Engrossing (Kirk)	10.00	
Section II.	4.25	
Stenographer, July 19	3.00	
		$2,208.22
Balance on hand July 25		$ 365.67

Respectfully submitted,

HENRY W. MORGAN, *Treasurer.*

Examined and approved.

Auditing Committee { V. H. JACKSON, T. S. WATERS, H. J. ALLEN.

On motion, it was recommended to the main body that the sum of $500 be voted to the treasury of the Committee on the International Dental Congress.

The Committee on Credentials then made a report.

Report of Committee on Credentials.

To the Executive Council of the National Dental Association.

Your Committee on Credentials respectfully report that they have examined and approved the credentials presented by delegates representing the following societies and colleges:

American Academy of Dental Science—Dr. Jas. McManus, Hartford, Conn.; Jno. F. Dowsley, Boston; Eugene H. Smith, Boston; Waldo E. Boardman, Boston; Chas. McManus, Hartford, Conn.

California State Dental Association—Dr. Walter G. Taylor, Sacramento.

Chicago Dental Society—Dr. Don. M. Gallie, Chicago.

Colorado State Dental Association—Dr. A. L. Whitney, Denver.

Connecticut State Dental Association—Drs. R. H. Keeler, New London; Jas. McManus, Hartford; Chas. McManus, Hartford; A. C. Fones, Bridgeport; J. T. Barker, Wallingford; C. W. Strang, Bridgeport; E. S. Gaylord, New Haven.

Dental Society of the State of New York—Dr. Frederick Messerschmitt, Rochester.

District of Columbia Dental Society—Drs. Chas. Diedell, Washington; J. K. Halley, Washington; J. H. London, Washington; R. W. Talbott, Wash-

ington; M. F. Finley, Washington; A. G. Brown, Washington; H. G. Allen, Washington; Wilhams Donnally, Washington; H. C. Thompson, Washington; S. W. Bowles, Washington; J. R. Walton, Washington; Paul W. Evans, Washington.

Hartford Dental Society—Drs. James McManus, Hartford; L. C. Taylor, Hartford; Chas. McManus, Hartford.

Harvard Dental Alumni Association—Drs. E. C. Blaisdell, Portsmouth, N. H.; C. E. Parkhurst, Somerville, Mass.; M. C. Smith, Lynn, Mass.; C. W. Rodgers, Boston; W. H. Potter, Boston; E. H. Smith, Boston; W. E. Boardman, Boston.

Harvard Odontological Society—Drs. E. C. Blaisdell, Portsmouth, N. H.; C. E. Parkhurst, Somerville, Mass.; E. H. Smith, Boston; W. E. Boardman, Boston.

Illinois State Dental Society—Drs. R. C. Brophy, Chicago; J. E. Nyman, Chicago.

Indiana State Dental Association—Dr. M. A. Mason, Fort Wayne.

Iowa State Dental Society—Drs. F. W. Conover, Decorah; Boyd Hubbard, Adair.

Kentucky State Dental Association—Dr. William Dietrich, Louisville.

Lynn Dental Society—Dr. Murdoch C. Smith, Lynn.

Maine Dental Society—E. C. Blaisdell, Portsmouth, N. H.

Michigan State Dental Association—Drs. G. L. Field, Detroit; H. C. Raymond, Detroit.

Missouri State Dental Association—Drs. Luther A. Young, St. Louis; D. J. McMillen, Kansas City.

Massachusetts State Dental Society—Drs. C. E. Parkhurst, Somerville; M. C. Smith, Lynn; J. F. Dowsley, Boston; C. W. Rodgers, Boston; C. E. Savage, Worcester; W. E. Boardman, Boston; E. H. Smith, Boston.

Nebraska State Dental Society—Drs. W. C. Davis, Lincoln; W. R. Smith, Pawnee City; W. T. Humphrey, Lincoln; J. J. McMullen, Omaha.

New Hampshire Dental Society—Dr. E. C. Blaisdell, Portsmouth.

New Jersey State Dental Society—Dr. J. M. Breen, New York.

Northeastern Dental Association—Drs. C. E. Parkhurst, Somerville, Mass.; Jas. McManus, Hartford, Conn.; J. F. Dowsley, Boston; J. T. Barker, Wallingford, Conn.; Geo. E. Savage, Worcester; C. W. Strang, Bridgeport, Conn.; W. E. Boardman, Boston; Chas. McManus, Hartford, Conn.; L. C. Taylor, Hartford, Conn.; E. S. Gaylord, New Haven, Conn.

Odontological Society of Chicago—Drs. J. E. Hinkins, Chicago; W. V-B. Ames, Chicago; A. W. Harlan, Chicago.

Odontological Society of Western Pennsylvania—Dr. C. C. Taggart, Pittsburg.

Ohio State Dental Society—Drs. H. E. Jenkins, Ironton; C. A. Hawley, Columbus.

Pennsylvania College of Dental Surgery—Dr. W. F. Litch, Philadelphia.

South Carolina Dental Society—Dr. J. M. Hair, Union.

Southern Wisconsin Dental Association—Dr. B. C. Campbell, Lake Geneva.

Tennessee State Dental Association—Dr. Henry W. Morgan, Nashville.
Texas State Dental Association—Dr. S. G. Duff, Greenville.
Wisconsin State Dental Society—Dr. H. L. Banzhaf, Milwaukee.

Respectfully submitted,
V. H. JACKSON,
T. S. WATERS,
W. N. COGAN.

The report of Section I was read.

Report of Secretary of Section I.

The Section has held three sessions and heard read the Chairman's report, which was recommended published in the transactions, as was also a supplementary report by the Secretary, and which was read by title and consisted of a review of the literature of the year on Orthodontia.

Five papers were read before the Section and disposed of as follows—one by Dr. Wright was confined to the Section; two by Drs. Spence and Berry were recommended for publication, they being entitled respectively, "Easy Methods of Experimentation in Plaster and Vulcanite," and "What Position Does the Prosthetist Hold in the Profession of Dentistry?" Two papers are recommended for reading before the general session, as follows—"A Plea for Abandonment of the Use of Vulcanite for Base-plates," by Dr. R. C. Brophy of Chicago; and the other, "Adhesion Versus Atmospheric Pressure in the Retention of Dentures," by Dr. N. C. Leonard of Nashville, Tenn. At the last session the election of officers took place, with the following result: Chairman, Dr. Hart J. Goslee of Chicago; Secretary, Dr. Wm. E. Walker of New Orleans.

Respectfully submitted,
WM. E. WALKER, *Secy.*

Supplementary Report by the Secretary of Section I.

The journalistic literature of the year has been unusually prolific in material bearing directly or indirectly upon orthodontia. Lack of space will, therefore, forbid more than brief abstracts of some of the more important papers and an enumeration of others of less pronounced value.

The *Forum* inaugurated (January, 1903, page 19) a section of orthodontia, edited by H. A. Pullen, and started out with a very interesting five-page editorial, entitled "The Present Status of Orthodontia."

In an editorial in the *International* (November, 1902, pages 854, 858), entitled "The Multiplication of Dental Associations," the American Society of Orthodontists, and orthodontia as a specialty, were considered; a special editorial was also devoted to this society's meeting. The editor, while of the opinion that one association should include all the specialties, each one constituting a section, speaks flatteringly of the work done this year by this society.

An editorial article entitled "Orthodontia and Specialism," in the *Cosmos* (February, 1903, page 151), compliments the Orthodontist's Society and the work which it is doing, filling two pages very interestingly. In closing the editor says that the orthodontist must possess "a kind of perceptive sense that will enable him to wisely calculate the amount of nervous and physical strain to which he may safely subject patients, a quality of mind that is developed only by long training and observation after a broad education in all the fundamentals of the science of healing." Also, "If orthodontia is to ultimately become a recognized specialty of dentistry, let the educational approaches to it be safeguarded so that the incompetent will be excluded, and none be admitted whose elementary training in dentistry has not been the broadest obtainable, and thereafter ripened by experience of practice supplemented by special study to fit him for this important work."

In the *Items* (August, 1903, page 615) is given a most excellent four-page editorial by Ottolengui on orthodontia as a specialty which should be read, not only by orthodontists, but by every dentist, whether an orthodontist or not.

Dr. Grevers of Amsterdam (Holland), gave a lecture before the First District Dental Society, New York, offering an original system of nomenclature in orthodontia, based upon the Greek word *Harmosis* (harmony), modified by various prefixes, as *enharmosis, epharmosis, opharmosis,* etc. (*Cosmos,* January, 1903, page 61.)

"Orthodontia" was the subject of a paper by W. H. Shulze, read before the Kansas State Dental Association (*Western,* September, 1902, page 390), in which among other good ideas he heartily approved of specialization.

In his address as president of the American Society of Orthodontists (*Items*, January, 1903, page 25), Dr. Angle detailed the objects of the society; gave his views as to why orthodontia should be a specialty, and expressed regret at the superficial teaching it received in the average dental school. Mention was made of some unsolved problems in orthodontia, and attention called to its important relation to the physiognomy. He advised the establishment of a standing committee on literature, its duties to be the making of a report at each meeting of all literature and inventions of the year pertaining to orthodontia.

Other papers read before the society were as follows:

Dr. Anna Hopkins, a paper, entitled "Orthodontia from the Standpoint of the Student" (*Items*, February, 1903, page 110). In this was pictured the burdens of dental students, with regrets that in most schools the study of orthodontia is put off until the graduating year, and in most instances even the study of normal and malocclusion.

R. S. Copeland contributed a paper entitled "Nasal Occlusion and Septal Deviation in Their Relation to Antral Development and Facial Expression" (*Items*, February, 1903, page 123). He commented on the close relationship existing between orthodontia and rhinology, not only from the proximity of the field of each, but also on account of embryologic reasons, and because of a common etiology. After touching on congenital and acquired malformations and mouth breathing, he gave an interesting passage on the permanent influence of psychical phenomena on the face. Septal deviation received attention, and explanation was given why malocclusion may result from diseases of the maxillary sinus.

C. H. Kohler, M. D., read a paper entitled "The Deformities of the Superior Maxilla from the Standpoint of the Rhinologist" (*Items*, March, 1903, page 180). This, a very valuable paper, dealt with malocclusion principally from an etiologic standpoint. After speaking briefly of the early theories of heredity, etc., he referred to normal and abnormal tendencies, the influence of diseases on deformities, deviations of the nasal septum, adenoids, enlarged tonsils, nasal hypertrophies, retarded development, and the necessity of nasal treatment. The author, however, makes a mistake quite common to rhinologists, and that is of forgetting that there are many cases of malocclusion *not* associated with nasal obstruction, and which, there-

fore, are never seen by rhinologists; since nearly all patients with malocclusion going to rhinologists are mouth-breathers with nasal obstructions, they naturally infer that *all* cases of malocclusion are caused by mouth-breathing, forgetting that sixty per cent of the cases of dental irregularities are not of the typical type which is almost invariably due to mouth-breathing.

In the *Items* (April, 1903, page 270) there appeared a paper by Dr. Kirk entitled "A Comparative Study of Mandibular Protrusion."

In this was emphasized the idea presented in a paper by your secretary, entitled "The Ground-work of Orthodontia Essential to the General Practitioner," before the American Society of Orthodontists at its meeting in 1901 (*Trans. Amer. Soc. Orthodontists,* 1901, page 49); from this I quote as follows: "It is to my mind apparent that there should be a distinction between those cases in which the defect is really in the lower arch as distinguished from those in which the defect exists in the upper arch. For instance, we may have two cases, both arranged in class II because the lower arch bears a distal relation to the upper, yet they may still be very different from one another, for in one case the upper arch may be in its normal position in relation to the rest of the face, and still the lower arch be distal in relation to the physiognomy as well as in relation to the upper arch; while in the other case, although the relation of the lower to the upper is the same, it in reality requires a different heading, because here the lower arch bears a normal relation to cranium and the rest of the face, the defect really being in the upper arch, which is mesial, not only in its relation to the lower arch, but also forward in its relation to the physiognomy. To treat the two cases alike would be a very grievous error."

Kirk calls attention to the fact that it is possible for the upper and lower arch to have the proper relation to one another (and thus constitute no *malocclusion* at all), but at the same time be forward of the position which they should occupy to the rest of the head. He uses illustrations from Cryer's work and suggests the adoption of the mental foramen as a fixed point from which to reckon orthognathism and prognathism. This appears to be an excellent suggestion when dealing with *specimens,* but it is difficult to understand just how he would locate the foramen in the living subject. His idea is made clear in the following quotation from his paper:

"I now want to leave this part of the subject, merely directing

your attention again to the suggestion that the relative fixedness of the mental foramen offers to those studying the subject a basis of classification of those irregularities of the dental arch which are designated as prognathism, either upper, lower or both, in which latter case we may have perfect occlusion according to the Angle standard, yet may have facial deformity due to the backward or forward position of both or one of the jaws as measured by the relations of the denture to the position of the mental foramen."

M. H. Cryer read a paper entitled "Normal and Pathological Anatomy of the Alveolar Process and Adjacent Tissues" (*Items,* May, 1903, page 339).

This is a very valuable paper and characteristic of the author; evidently the result of great labor and painstaking sectioning of frozen, injected cadavers. It is well worth the time of anyone to study it, as it seems to present only truths except, however, that the writer is inclined to minimize the effect of the tongue in shaping the dental arch. He comments on the apparent lack of influence of the tongue as shown in several sections, apparently not appreciating the possibility that the subjects might have been mouth-breathers, in which case the tongue cannot be expected to influence the upper arch, as it is held down away from the upper teeth and vault, in order that the air may pass over it. There are some features about the illustrations of the cases in question which make it appear as though they probably were mouth-breathers; for instance, there is not only the narrow upper arch, but also poorly developed antra, imperfect nasal passages and a general narrowing of the head.

L. S. Lourie read a paper entitled "Distal Movement of Molars and Bicuspids" (*Items,* June, 1903, page 433).

This is an interesting illustrated article. The most important point brought forward is the fact that by use of the Baker anchorage, if the upper wire arch is made to pull back on one tooth at a time, instead of on the entire dental arch, the molars and bicuspids can be moved distally so as to accommodate the crowded-out cuspids which they had cheated by having moved forward. By this method two points are gained; *first,* the avoidance of the extraction which would otherwise be necessary, and *second,* the restoration of the normal molar occlusion.

He also illustrates a case in which a lingual cusp is attached to the upper cuspid, so as to occlude distally to the lower cuspid, for

the purpose of preventing the upper cuspid, and the bicuspids and the molars which have been moved distally, from moving forward.

Herbert A. Pullen read a paper entitled "Fixed and Removable Appliances; Alone and in Combination" (*Items,* June, 1903, page 439).

This was an interesting article in recommendation of the Jackson system, either alone or in combination with other methods, in certain cases of malocclusion.

Dr. Pullen gave a clinic on the combination of fixed and removable appliances at the Union Convention of the Seventh and Eighth District Dental Societies (N. Y.) (*Cosmos,* March, 1903, page 227).

A. H. Thompson read a paper entitled "Malocclusion of the Teeth Among the Ancient Peruvians" (*Items,* July, 1903, page 493).

After commenting on the high state of civilization developed, especially in the ruling classes, and describing their method of compressing the skull in the young, he notes the malposition found in each class of teeth, with regard to torsion and lingual occlusion as well as buccal and lateral, but he fails to mention mesial or distal occlusion, a fact to be regretted, as it leaves us without information as to whether or not such irregularities ever occurred among the ancient Peruvians.

A paper contributed by John Humphries of Leeds, England, entitled "Variation in Human Dentition," was read by Dr. Brady (*Items,* August, 1903, page 561). The author claims that the dental arch is growing smaller, and that eventually the lateral incisors and the third molars will disappear from the arch. The paper was discussed by Drs. Littig, Grevers and Summa, Dr. Grevers disagreeing with the essayist in his conclusions.

R. Ottolengui read a paper entitled "Retrusion of Both Jaws With a Single Appliance" (*Items,* August, 1903, page 572). In the treatment of the case in question, the four first bicuspids were extracted and a Jackson crib made to retrude the upper incisors, the appliance also causing these teeth to act as an inclined plane to retrude the lower ones. Previous to giving the details of the case in question, the writer asked for light on the modern doctrine of classification and expressed his surprise that no formal expression of opinion had been made upon your secretary's suggestion that the

Angle system, which considers the teeth in their occlusal relations only, should be supplemented by a further classification of the varied relations of the jaws to the physiognomy.

In the report of the proceedings of the society published by the *Cosmos* (February, 1903, page 139), brief mention is made of a paper read by W. J. Brady, entitled "The Causes of Malocclusion," the author claiming that "non-oxygenation of the tissues played the most important part in the production of irregularities, in that it interfered with the development of the tissues of the maxillæ and by the breaking up of the normal relations of the jaws caused over-development of the mandible."

An abstract is also given of a paper by Dr. Angle, entitled "Art in Relation to Orthodontia" (*Cosmos,* February, 1903, page 142). In this paper the author sets up a vigorous opposition to the practice of extraction, impressing the idea that the most harmonious results can be obtained "by retaining all the teeth and putting them in proper occlusal relation, harmonizing them with the other features of the face."

THE FIRST PERMANENT MOLARS.

Dr. Angle contributes a copyrighted paper entitled "The Importance of the First Molars in Their Relation to Orthodontia" (*Cosmos,* March, 1903, page 173).

This is an important article in which, after considering the matter mentioned in the title, Dr. Angle illustrates his new expansion arch, the new feature being the rib on the labial surface. In this paper the author adopts Dr. Lourie's idea of moving the upper molars distally, thus giving recognition himself to the fact that some cases called in his classification "distal occlusion," because the lower molars are distal of their normal relation to the upper, are in reality cases of superior mesial occlusion.

"The First Molars of the Permanent Set of Teeth" is the title of a paper by L. Ashley Faught, read before the Odontological Society of Western Pennsylvania (*Summary,* July, 1903, page 532). The subject is well handled and well discussed (*Summary,* August, 1903, page 624).

"The First Permanent Molar" by Dr. Crouse (*Digest,* December, 1902, page 1071), read before the Illinois State Dental Society, is an argument against extraction, and was well and favorably discussed.

Dr. Bogue presented, before the First District Dental Society of New York, a paper entitled "Why I Treat the First Permanent Molars With Respect" (*Cosmos,* July, 1903, page 541).

While the paper is not purely orthodontic, as it gives many reasons other than orthodontic why the first molars should not be extracted, at the same time the author points out the ill effects the extraction of the first permanent molar has on the remaining teeth, from the orthodontic standpoint as well as others.

Dr. Bogue also contributes an elaborate article profusely illustrated entitled "The Principal Molar in Man and Its Relations to and Bearings Upon the Other Teeth" (*Cosmos,* August, 1903, page 605; and *International,* August, 1903, page 569). This article should be read by every dentist.

An illustrated essay entitled "Observations on Some Recent Cases of Orthodontia," by Bogue, was read before the Section on Stomatology, American Medical Association, and well discussed (*International,* December, 1902, page 869).

Dr. Bogue also read a paper before the New York Institute of Stomatology entitled "Some of the Causes of Irregular Teeth, With Suggestions as to Preventive Treatment or Early Cure" (*International,* April, 1903, page 241).

Before the anniversary meeting of the New York Odontological Society, Dr. Angle exhibited, and demonstrated on models, his methods of procedure, accompanied by a lantern slide exhibition (*Cosmos,* May, 1903, page 385).

Before the May, 1903, meeting of the Texas State Dental Association a paper was read by Dr. Markwell of Galveston, which follows Angle closely, and condenses much into small space (*Texas Journal,* June, 1903, page 10, and *Register,* August, 1903, page 415).

Angle's method of making plaster impressions and models in orthodontia was demonstrated by F. M. Casto before the Ohio State Dental Society in December. The published paper is an excellent presentation of the subject (*Summary,* March, 1903, page 191).

"Orthodontia—The Age for Treatment," by J. N. MacDowell, is a well considered argument for early treatment (*Summary,* July, 1903, page 501).

"Irregularities and How to Correct Some of Them" is the title of a paper read before the Southwestern Michigan Society by J. H. Stofflett (*Register,* November, 1902, page 553).

A paper entitled "Expansion Versus Extraction in Regulating" was read before the Metropolitan Branch, British Dental Association, April, 1903, by Harry Baldwin (*Brit. Dent. Journal,* June, 1903, page 350). The article, a liberal one, was well discussed.

Dr. Case made an exhibition before the Chicago Odontographic Society of models showing the results of the injudicious extraction of the permanent teeth. His remarks furnish interesting reading to the orthodontist (*Review,* January, 1903, page 58).

S. E. Davenport read before the New York Institute of Stomatology a paper entitled "Stray Thoughts About Regulating" (*International,* October, 1902, pages 736 and 749). He insists upon the importance of postponing any attempt at moving teeth until casts have been made and studied exhaustively in connection with the face. He makes a strong argument against extraction in regulation, and reminds us that much of the pain caused in regulating is due to the impinging upon the gum of the appliances or material and advises the use of fish-line tied between the teeth for separation. A merited compliment is paid to V. H. Jackson, and a description given of the use of the Jackson bandages and the split screw plate for expanding the arches both above and below and with screws in the edge to move individual teeth.

At the same meeting, under the head of "Communications on Theory and Practice," many interesting cases of supernumerary teeth were cited, these being of interest to the orthodontist.

At the March meeting of the New York Odontological Society, under the head of "Incidents of Office Practice," several cases of retained deciduous cuspids, at ages past thirty, were cited by Drs. Goldsmith and Jarvie (*Cosmos,* August, 1903, page 637).

In one of the cases given, the deciduous cuspid was extracted, the process cut away, and at the time of the recital the permanent tooth was coming down, and it was expected that it would be in normal position in less than twelve months.

In an article entitled "The Management of Non-eruption of Teeth," by S. L. McCurdy, the subject is treated entirely with reference to the operation for the removal of impacted teeth (*Summary,* December, 1902, page 693).

J. R. Beach, Clarksville, Tenn., furnishes an illustrated report of a case in which a perfect third molar erupted through the cheek (*Items,* January, 1903, page 9).

"Jumping the Bite" is the title of an interesting paper read by G. B. Terrell (*International*, August, 1903, page 594). The paper is illustrated by two pairs of occluded casts—"Before and After"—and illustrations of the movable devices used in the movements; a combination of Jackson clasps, vulcanite plates with velum rubber flanges, arch expanding screw, individual tooth-moving screws, occlusal inclined plane, and large screws fitted in threaded tubes, the accidental turning of which was overcome by resin. Unfortunately no photograph was taken at the beginning of the case, so that we are unable to determine to what extent the corrected occlusion is due to the dental arch being carried forward or to what extent the lower arch or the body of the jaw was carried back.

"Relation of the Nose, Throat and Ears to the Teeth" is the title of a paper read by T. F. Rumbold before the St. Louis Dental Society (*Era*, March, 1903, page 100).

Under the head of "High Arches and Irregular Teeth," Dr. Rumbold makes an interesting observation concerning nasal and oral conditions in the first year of life, and suggests the judicious increase of the circulation in the parts as the proper remedy for arrested development.

Dr. Rumbold, the author, died shortly after the presentation of this paper.

A series of papers entitled "Deformities of the Bones of the Face and Nose," by Talbot, originally published in the *Laryngoscope*, and republished in the *Dental Era* (January, February and March, 1903), contains much that is of interest to the orthodontist in regard to the etiology of deformities due to or resulting in irregularities of the teeth.

"Mouth-Breathing and Its Consequences," by W. D. C. Prideaux of England (*Jour. Brit. Dent. Assoc.*, March, 1903, page 125). This is a valuable article, with illustrations of several cases. The value of the article is enhanced by an extended bibliography, principally medical works, only two being dental.

RESECTION OF THE MANDIBLE.

The subject of resection of the mandible has received some attention during the past year. Those not familiar with the earlier chapters in the history of this operation are referred to the following issues of the dental journals: *Cosmos*, July and August, 1898; *International*, October, 1898, and February, May and August, 1899.

The opening paper in the series is a description by Dr. J. W. Whipple of the operation performed by Dr. V. P. Blair in December, 1897, the patient having consulted Dr. Whipple at intervals from 1891 up to date of the operation, but little change having been observed up to that time. The succeeding articles are from the pens of Angle, Talbot and Lukens.

The subject was reopened in April, 1903, by a paper from Angle illustrating a history of the case with halftones of the occluded casts taken in January, 1897 (*Cosmos*, April, 1903, page 268); the case was operated upon by Dr. Blair in December of that year. A halftone of the occluded casts of the case as it is at present is shown, also a profile photograph, from which it is seen that the patient now has a slightly retreating chin and an obtuse naso-labial angle; it would therefore appear as though more bone than was necessary had been removed from the mandible and that the case apparently might have been corrected by moving the teeth in the lower arch back so as to close the spaces between them, and either opening a space between the upper teeth and carrying the oral teeth forward, or by carrying the entire upper arch forward so as to change the naso-labial angle to a right, or acute, angle which, it would seem, would have given a better face. One would of course be better prepared to judge of the chin if a profile photo had been taken before the operation, but the profile presented is sufficient to enable one to judge of the upper lip, for the operation is not supposed to have changed that.

Dr. Angle's proposed technique is criticised by Dr. Ottolengui, the latter apparently assuming that the flanges which extend over the buccal surface of the gum are in contact with these surfaces (*Cosmos*, June, 1903, page 454).

What is claimed to be a double resection of the mandible was done by Hullihen as long ago as 1848. In that case, however, in place of the jaw being sawed clear through, a V-shaped piece was taken out and the jaw bent up, so that the operation differs from the one under consideration (*Review*, April, 1903, page 374).

Dr. Cigrand read before the Rockford Odontological Society a paper entitled "A Knowledge of Faciology Essential to Dental Prosthetists" (*Review*, September, 1902, page 717). Although written from the standpoint of prosthesis, the latitude of the paper is such as to make it of interest to the orthodontist.

"The Physiology of Mastication, and Kindred Studies." Under this title a series of articles by J. Sim Wallace of London, Fngland, published in the *Dental Record,* including a series of papers on the "Irregularities of the Teeth," have been gathered together in a little volume published by Churchill, London, and P. Blakiston Sons Co., Philadelphia. The editor of the *Review* says, "There is much good, common sense in the book and some vigorous thinking."

In a paper entitled "Simple Methods," Dr. J. B. Littig tells of his success with old methods. His paper is illustrated with two woodcuts of pairs of casts (*Items,* August, 1903, page 585).

Dr. W. H. Reaben, in an article entitled "Dental Surgery," read before the Mississippi Dental Association (*Headlight,* July, 1903, page 102), devotes some space to orthodontia and tells of his success in spreading the arch by opening a space with a separator and placing cement between the teeth to preserve the space, repeating as often as necessary.

Stanley Reed, dental surgeon to the Dental Hospital, Brighton, England, contributes an illustrated paper entitled "A System of Regulation by Means of Screw-plates" (*Record,* May and June, 1903).

A case of pronounced superior protrusion from thumb sucking, reduced with screws in seven weeks, molars and bicuspids being used as anchorage by cementing silver caps to them, is reported by Dr. A. Drake (*Brit. Dent. Journal,* May, 1903, page 394).

A paper entitled "Some Things the General Practitioner Ought to Take Into Account in Orthodontia" was read before the Southwestern Michigan Dental Society by C. B. Blackmarr (*Register,* December, 1902, page 599).

THE X-RAY IN ORTHODONTIA.

As no man with any considerable practice can be considered an up-to-date orthodontist who does not make frequent use of the X-ray, I have included in my report on the orthodontic literature of the year that which has appeared on the X-ray. The first paper I will mention is one by S. Mitchell, entitled "X-rays in Dentistry" (*Record,* May, 1903, page 214).

L. E. Custer addressed the Second District Dental Society on "The X-ray Made Available for All Dentists," and also gave clinical demonstrations (*Items,* March, 1903, pages 219, 227).

He also read a paper before the Academy of Stomatology, Philadelphia, entitled "The Practical Use of the X-ray in Dentistry" (*International,* April, 1903, page 247).

P. M. Hickey read a paper before the Michigan State Dental Association entitled "X-rays in Dentistry" (*Digest,* May, 1903, page 573).

Dr. MacDowell contributes a paper on "Using the Stereoscope With the X-ray in Dentistry" (*Review,* June, 1903, page 504).

Dr. R. L. Smith in a three-page article gives the various uses of the X-ray in dentistry, including their value in orthodontia (*Texas Journal,* June, 1903, page 3).

Respectfully submitted,

WM. E. WALKER, *Secy.*

The subject of the publication of the transactions was taken up for consideration, and, on motion, it was recommended that they be given to Dr. J. N. Crouse on the same conditions as heretofore, and that the publication be under direct supervision of the Publication Committee.

On motion, the Council adjourned.

A. H. PECK, *Recording Secretary.*

APPENDIX

EX-PRESIDENTS OF THE AMERICAN DENTAL ASSOCIATION.

1859*	W. W. Allport	Chicago, Ill.
1860	W. H. Atkinson	Cleveland, Ohio.
1861	No meeting.	
1862	George Watt	Xenia, Ohio.
1863	W. H. Allen	New York, N. Y.
1864	J. H. McQuillen	Philadelphia, Pa.
1865	C. W. Spalding	St. Louis, Mo.
1866	C. P. Fitch	New York, N. Y.
1867	A. Lawrence	Lowell, Mass.
1868	Jonathan Taft	Cincinnati, Ohio.
1869†	Homer Judd	St. Louis, Mo.
1870	W. H. Morgan	Nashville, Tenn.
1871	Geo. H. Cushing	Chicago, Ill.
1872	P. G. C. Hunt	Indianapolis, Ind.
1873	T. L. Buckingham	Philadelphia, Pa.
1874	M. S. Dean	Chicago, Ill.
1875	A. L. Northrop	New York, N. Y.
1876	Geo. W. Keely	Oxford, Ohio.
1877	F. H. Rehwinkel	Chillicothe, Ohio.
1878	H. J. McKellops	St. Louis, Mo.
1879	L. D. Shepard	Boston, Mass.
1880	C. N. Peirce	Philadelphia, Pa.
1881	H. A. Smith	Cincinnati, Ohio.
1882	W. H. Goddard	Louisville, Ky.
1883	E. T. Darby	Philadelphia, Pa.
1884	J. N. Crouse	Chicago, Ill.
1885	W. C. Barrett	Buffalo, N. Y.
1886	W. W. Allport	Chicago, Ill.
1887	Frank Abbott	New York, N. Y.
1888	C. R. Butler	Cleveland, Ohio.
1889	M. W. Foster	Baltimore, Md.
1890	A. W. Harlan	Chicago, Ill.
1891	W. W. Walker	New York, N. Y.
1892	J. D. Patterson	Kansas City, Mo.
1893	Formal session only, owing to the holding of the World's Columbian Dental Congress; officers elected in 1892 held over until 1894.	
1894	J. Y. Crawford	Nashville, Tenn.
1895	J. Y. Crawford	Nashville, Tenn.
1896	Jas. Truman	Philadelphia, Pa.

*First meeting, for organization.

†Owing to a change in the Constitution, officers elected at this and the sessions following served at the next annual meeting subsequent to their election.

EX-PRESIDENTS OF THE SOUTHERN DENTAL ASSOCIATION.

1869*	W. T. ARRINGTON	Memphis, Tenn.
1870	W. T. ARRINGTON	Memphis, Tenn.
1871	JAS. S. KNAPP	New Orleans, La.
1872	F. Y. CLARK	Savannah, Ga.
1873	H. M. GRANT	Abingdon, Va.
1874	ROBT. ARTHUR	Baltimore, Md.
1875	J. R. WALKER	New Orleans, La.
1876	W. T. ARRINGTON	Memphis, Tenn.
1877	W. G. REDMOND	Louisville, Ky.
1878	S. J. COBB	Nashville, Tenn.
1879	F. J. S. GORGAS	Baltimore, Md.
1880	J. B. PATRICK	Charleston, S. C.
1881	V. E. TURNER	Raleigh, N. C.
1882	E. S. CHISHOLM	Atlanta, Ga.
1883	L. D. CARPENTER	Atlanta, Ga.
1884	H. J. MCKELLOPS	St. Louis, Mo.
1885	A. O. RAWLS	Lexington, Ky.
1886	W. C. WARDLAW	Augusta, Ga.
1887	W. W. H. THACKSTON	Farmville, Va.
1888	B. H. CATCHING	Atlanta, Ga.
1889	J. Y. CRAWFORD	Nashville, Tenn.
1890	JOHN C. STOREY	Dallas, Tex.
1891	G. F. S. WRIGHT	Georgetown, S. C.
1892	GORDON WHITE	Nashville, Tenn.
1893	B. HOLLY SMITH	Baltimore, Md.
1894	Same officers hold over.	
1895	H. E. BEACH	Clarksville, Tenn.
1896	JOHN S. THOMPSON	Atlanta, Ga.
1897	W. H. RICHARDS	Knoxville, Tenn.
1898†	E. P. BEADLES	Danville, Va.

*First meeting, for organization; Jas. S. Knapp, Chairman *pro tem.*

†First President of the Southern Dental Association as a branch of the National Dental Association, organized August, 1897, by the consolidation of the American Dental Association and the Southern Dental Association.

LIST OF OFFICERS.

PRESIDENT—C. C. Chittenden, 21 W. Main St., Madison, Wis.

VICE-PRESIDENT—East—Waldo E. Boardman, 184 Boylston St., Boston, Mass.

VICE-PRESIDENT—South—J. G. Fife, 301 Trust Bldg., Dallas, Tex.

VICE-PRESIDENT—West—H. P. Carlton, Crocker Bldg., San Francisco, Cal.

CORRESPONDING SECRETARY—C. S. Butler, 680 Main St., Buffalo, N. Y.

RECORDING SECRETARY—A. H. Peck, 92 State St., Chicago, Ill.

TREASURER—V. E. Turner, 107½ Fayetteville St., Raleigh, N. C.

EXECUTIVE COMMITTEE.

J. D. Patterson, *Chairman*.....Keith and Perry Building, Kansas City, Mo.

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KNOBELOCK, L. E.....Charleston, S. C.
LAW, E. A.....Bartow, Fla.
LEONARD, N. C.....Nashville, Tenn.
LITTLE, J. B.....Newton, N. C.
MARKWELL, RUSSELL .....Galveston, Tex.
MCFERRIN, M. .....Nashville, Tenn.
MCMILLEN, D. J.....11 Locust st., Kansas City, Mo.
MCTYRE, R. P.....Bessemer, Ala.
MCMULLEN, J. J.....N. Y. Life Bldg., Omaha, Neb.
MERCHANT, M. S.....Giddings, Tex.
MERRIWETHER, T. M.....Westminster, S. C.
MESSERSCHMITT, FREDERICK.....Rochester, N. Y.
MILAM, T. M.....Little Rock, Ark.
MOORE, T. T., JR.....Columbia, S. C.
MORGAN, H. W.....Nashville, Tenn.
NABORS, S. F.....Birmingham, Ala.
NEILL, F. A.....Decatur, Ala.
NYMAN, J. E.....34 Washington st., Chicago, Ill.
PAGE, A. S.....Columbia, Tenn.
POTTER, W. H.....16 Arlington st., Boston, Mass.
RAMSEY, W. B.....Hickory, N. C.
REED, G. R.....Marion, N. C.

RICH, S. L. ..... Nashville, Tenn.
RICHARDSON, CHAS. ..... Fayetteville, Ark.
RODGERS, C. W. ..... 165 Howard st., Dorchester, Mass.
SHARP, S. P. ..... Knoxville, Tenn.
SIMONS, B. W. ..... Charleston, S. C.
SMITH, J. P. ..... Martinsville, Va.
SPENCE, S. J. ..... Chattanooga, Tenn.
STEWART, ELBERT ..... Little Rock, Ark.
STRANG, C. W. ..... Bridgeport, Conn.
TAGGART, C. C. ..... Lewis Bldg., Pittsburg, Pa.
TAYLOR, J. WALTER ..... 706 K st., Sacramento, Cal.
THOMPSON, R. W. ..... Spartanburg, S. C.
TUNSTALL, P. R. ..... Mobile, Ala.
VANN, N. N. ..... Attalla, Ala.
WARE, R. E. ..... Shelby, N. C.
WATKINS, J. C. ..... Winston, N. C.
WESTMORELAND, W. W. ..... Columbus, Miss.
WHITMAN, A. B. ..... Orlando, Fla.
WHITMON, F. L. ..... Auburn, Ala.
WOMACK, C. T. ..... Martinsville, Va.
WRIGHT, T. C. ..... Tupelo, Miss.
YOUNG, L. A. ..... 4661 Maryland ave., St. Louis, Mo.

Membership as Represented by States.

New York	52	Florida	10
Illinois	52	Mississippi	10
Pennsylvania	52	Minnesota	9
Tennessee	32	Nebraska	8
North Carolina	29	Louisiana	8
Georgia	29	Indiana	7
Wisconsin	28	Colorado	7
District of Columbia	27	Arkansas	4
South Carolina	27	Canada	4
Alabama	24	Oregon	3
Ohio	24	Kansas	3
Massachusetts	20	Washington	2
New Jersey	18	Oklahoma Territory	2
Missouri	18	Delaware	1
Iowa	17	New Hampshire	1
Connecticut	15	North Dakota	1
Maryland	14	Rhode Island	1
Virginia	14	Philippine Islands	1
California	12	Nova Scotia	1
Texas	12	France	1
Michigan	11		
Kentucky	10	Total	620

Constitution of the National Dental Association.

PREAMBLE.

We, the members of the American Dental Association and of the Southern Dental Association, do declare ourselves a Society to cultivate the Science of Dentistry, and have adopted the following Constitution and Rules of Order for our government:

CONSTITUTION.

Adopted at Old Point Comfort, August 5, 1897.
Revised and amended at Asheville, N. C., August, 1903.

ARTICLE I.

NAME.

This organization shall be known by the name of the National Dental Association.

ARTICLE II.

OBJECT.

The object of this Association shall be to cultivate the science and art of dentistry and all its collateral branches, to elevate and sustain the professional character of dentists, to promote among them a mutual improvement, social intercourse and good feeling, and collectively to represent and have cognizance of the common interests of the dental profession.

ARTICLE III.

MEMBERS TO BE OF THREE CLASSES.

SECTION 1. The members of this Association shall be of three classes, viz., permanent, delegate, and honorary members; the two former classes having equal rights and privileges, except that none but permanent members shall be eligible to office.

PERMANENT MEMBERS.

SECTION 2. Permanent members shall consist of those who, coming as delegates and complying with the requirements of the Association, shall sign a statement in a book to be kept for that purpose, signifying to the Treasurer a desire for permanent membership.

DELEGATE MEMBERS.

SECTION 3. All members shall be practitioners of dentistry. They shall be received only from permanently organized dental societies. They shall be elected by ballot at some regular meeting of their society, and shall be members who have done some meritorious work for the profession; but no person shall be received as a delegate who is in arrears for dues to this Association.

SECTION 4. Honorary members shall consist of prominent, worthy members of the dental profession residing in foreign countries, who shall be elected by ballot.

SECTION 5. It is hereby specially provided that all persons at present permanent members of the American Dental Association and of the Southern Dental Association are permanent members of this Association, and entitled to all the privileges of the class to which they belong, without further action, and the Treasurer is hereby directed to transcribe their names upon the roll of membership of this Association.

ARTICLE IV.

DELEGATES FROM STATE SOCIETIES.

SECTION 1. Any permanently organized dental society may send one for every six of its active members as delegates to this Association for one year, upon complying with the requirements of its Constitution; but no society shall be entitled to representation that does not accept or substantially recognize the Code of Ethics of this Association.

SECTION 2. Each delegate shall present credentials which shall be approved by the Executive Committee.

SECTION 3. If the Committee on Credentials has knowledge that any applicants for membership are violating the Code of Ethics, said applicants shall not be received, but shall be referred by the committee to the societies whose delegates they are, and in no case shall this Association be compelled to treat with violations of the Code except the violator is a member of this body and has no membership in any local body.

SECTION 4. This Association will receive no delegates who, since August, 1875, shall have entered the profession without having first graduated at some reputable dental or medical college.

ARTICLE V.

SIGNING CONSTITUTION.

SECTION 1. Each new member, before voting or speaking on any subject before the meeting, shall sign this Constitution, inscribing his name and the title of the society from which he receives his appointment. It is expressly agreed by each member in signing this Constitution that he will accept the discipline of a two-thirds vote of this Association.

DUES.

SECTION 2. The annual dues in this Association shall be five dollars,

DUES—TO BE PAID.

SECTION 3. No member is eligible to office, nor can he speak or vote in this Association, in any of its sections, or in any of its branches, until his annual dues are paid.

DUES—IF UNPAID.

SECTION 4. If the dues of any member remain unpaid for two years his name shall be erased from the list of members of this Association.

CONDUCT OF MEMBERS.

SECTION 5. Any act of special immorality or unprofessional conduct committed by a member of this Association shall be referred to the Executive Committee, whose duty it shall be to thoroughly examine into the case, and if the charges be sustained, to report to the Executive Council during the annual session at which the charges are preferred. Whereupon, by a vote of the council the offending member may be reprimanded or expelled, a two-thirds vote being required for expulsion, a majority being sufficient for reprimand.

EXPELLED MEMBERS.

SECTION 6. Any member of this Association being expelled or suspended from his local society, shall from that date cease to be a member of this body.

RESIGNATION OF MEMBERS.

SECTION 7. Any member not in arrears may offer his resignation, upon the acceptance of which by the council, his membership shall cease; but the Council may at any time thereafter reinstate such member by unanimous consent. In case a member is dropped for non-payment of dues, two years' dues must be paid before reinstatement; nor shall he represent his Society as a delegate until the two years' back dues are paid.

ARTICLE VI.

OFFICERS.

SECTION 1. The officers of this Association shall be a President, three Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, an Executive Committee consisting of nine members, an Executive Council consisting of the President, Secretary, and five members, three Chairmen and three Secretaries of Sections, to be elected as hereinafter provided.

SECTION 2. Each officer, except as otherwise provided, shall hold his appointment for one year, or until another is elected and qualified to succeed him.

SECTION 3. The President shall be chosen from the division in which the next annual session is to be held, and one of the Vice-Presidents shall be chosen from each division. (See Article XII.)

SECTION 4. At the first election three members of the Executive Committee shall be elected from each division of the country, who shall hold

office for one, two and three years, respectively; afterward but one member shall be elected each year from each division, and hold office for three years.

SECTION 5. One member of the Council shall be elected each year from the division in which the newly elected President resides, and two members from each of the others.

SECTION 6. At the first election after this amendment goes into effect, one chairman and one senior and one junior past chairman for each section shall be elected. Thereafter one Chairman and one Secretary of Sections shall be elected each year from each division, and each Chairman of Sections shall be known as Junior Past Chairman for the first year and as Senior Past Chairman for the second year after the expiration of his time as Chairman.

SECTION 7. The names of places for holding the next annual session and the candidates for office shall be nominated by informal ballot of the Association. The three names that are highest, or in case of tie, four names having the greatest number of votes shall be the sole nominees. A formal ballot shall then be taken in which a majority of the ballots cast shall be necessary to a choice. If a choice be not made on the second formal ballot the name of the candidate receiving the fewest votes shall be dropped on the third formal ballot. The informal ballot may be made a formal ballot by a three-fourths vote of the Association. Provided that for the re-election of Recording Secretary, Corresponding Secretary, Treasurer and Secretaries of Sections a motion, seconded, that the Recording Secretary, or Treasurer, shall cast the ballot, shall be entertained, but if this fails to carry, nomination shall be made as herein before specified.

ARTICLE VII—DUTIES OF OFFICERS.

DUTIES OF PRESIDENT.

SECTION 1. The President shall preside according to parliamentary usage as laid down in "Robert's Rules of Order" and the Rules of Order adopted by this Association, and shall present an annual address.

DUTIES OF VICE-PRESIDENT.

SECTION 2. In the absence of the President, one of the Vice-Presidents shall perform the duties of the office, and in absence of these officers a Chairman pro tem shall be appointed by the Executive Council.

DUTIES OF CORRESPONDING SECRETARY.

SECTION 3. The Corresponding Secretary shall attend to the correspondence of the Association with other scientific bodies, when desirable, and with the societies represented in this Association. It shall be his duty to obtain information of and report annually to the Executive Council, and with its approval to this Association, an account of the meetings held, the numbers of the membership and attendance, subjects discussed in papers, essays, or otherwise, by the Societies represented in this Association, and such other matters of interest as may be well to incorporate in the proceedings of this body.

DUTIES OF RECORDING SECRETARY.

SECTION 4. The Recording Secretary shall keep accurate minutes of the proceedings of the Association, preserve the archives and unpublished documents, and attend to the other duties that pertain to his office. He shall be ex-officio Chairman of the Publication Committee, and shall see that due notice is given of the time and place of the annual sessions of the Association. He shall be secretary of the Program Committee and see to the preparation and printing for this committee and its distribution to the members of all societies represented in this Association, and shall provide each newly elected official with a correct copy of this constitution.

DUTIES OF TREASURER.

SECTION 5. The Treasurer shall hold all the moneys belonging to the Association, and shall keep an accurate account as between the Association and its members. He shall furnish bonds satisfactory to the Executive Committee. He shall attend the session of the Executive Committee at 9 a. m. on the first day of the annual session to receive dues, and shall attend at roll call to verify the lists of names upon payment of dues within the legal limits, and shall notify all whose names may be erased from the list of membership. He shall pay the drafts of the Secretary, countersigned by the President, and shall report to the Executive Committee, where his accounts shall be audited and by whom his report shall be presented to the Executive Council, together with their own.

SECTION 6. All resolutions appropriating money, exxcept for the legitimate expense of this Association, shall require a two-thirds vote of all the members of the Association present at a general session of an annual session.

ARTICLE VIII.

EXECUTIVE COMMITTEE.

SECTION 1. The Executive Committee shall be the business committee ad interim of the Association. They shall report to the Executive Council at each annual session, under the proper head, their doings for the current year.

SUB-DIVISION OF THE EXECUTIVE COMMITTEE.

SECTION 2. The Executive Committee shall meet after the election of new members to choose their own chairman and secretary, and to divide themselves into three sub-committees as follows, and for the purpose described:

FIRST DIVISION—OF THE EXECUTIVE COMMITTEE.

SECTION 3. The first division of the Executive Committee shall include its chairman. It shall act as the Committee of Arrangements, and shall make suitable preparations for the meetings of the Association, consulting with the Program Committee as to its needs. It shall report to the Executive Council at its first meeting of the annual session and with its approval see to the carrying out of the arrangements during the annual session. It shall

provide a book for the registration of members or visitors as they arrive; and it shall be their further duty to secure from the Treasurer a good and sufficient bond.

SECOND DIVISION—CREDENTIALS AND AUDITING COMMITTEE.

SECTION 4. The second division of the Executive Committee shall act as the committee on registration, and shall meet for that purpose at 8 a. m. on the first day of the annual session. They shall examine and verify the qualifications of members, including all violations of the code of ethics and the Constitution. They shall register the names of members or visitors as they arrive, with place of their residence and hotel address, and give them all necessary information regarding the arrangements for the meetings, the literary program, and arrangements for entertainment, if any. They shall also act as the auditing committee for the year.

THIRD DIVISION—COMMITTEE ON VOLUNTEER ESSAYS.

SECTION 5. It shall be the duty of the third division to examine all essays, papers or reports that may be referred to it by the Executive Council before presentation to the Association and to report to the Executive Council their approval or disapproval of such essays, papers or reports in whole or in any particular parts to the end that the time of the Association may not be occupied by reading of irrelevant, unimportant or improper matter.

REPORTS OF SUB-COMMITTEES.

SECTION 6. Each of these sub-committees shall report from time to time, as may be necessary, to the Executive Committee as a whole, who shall decide upon such report, if possible; but in case of their inability to decide upon any matter, it shall be brought before the Executive Council for its decision.

MEETINGS OF EXECUTIVE COMMITTEE.

SECTION 7. The Executive Committee shall, if possible, meet for consultation and arrangement of their respective duties on the day preceding the annual session of the Association. The Chairman may at his discretion summon the members thereof to a meeting for consultation or making reports, at any suitable hour during the annual session of the Association, and at any other time at the request of five members of the committee.

ARTICLE IX.

EXECUTIVE COUNCIL.

SECTION 1. The Executive Council shall be the business head of the Association during its annual session and when it deems it necessary, have charge of all its business matters whatever; and it will be its duty to take cognizance of the doings of any and all of its officers, see to the smooth working of all of its parts, and attend to all matters referred to it.

SECTION 2. The Executive Council shall meet at nine o'clock on the day of the first meeting of each annual session, to receive the reports of commit-

tees and afterward by adjournment or at the call of the presiding officers and committees, for the transaction of other business of the Association.

SECTION 3. All matters not otherwise specially provided for shall be referred to the Executive Council without debate.

SECTION 4. The Executive Council shall report to the Association at each general session the results of their proceedings for ratification or rejection without debate.

SECTION 5. The President and Secretary of this Association shall hold the same positions in the Executive Council as in the Association.

SECTION 6. Five members of the Council shall constitute a quorum for the transaction of business.

SECTION 7. All meetings of the Council shall be public; the time and place for which shall be posted for information of the members. Members may be heard on any matter before the Council.

ARTICLE X.

LOCAL COMMITTEE OF ARRANGEMENTS.

SECTION 1. There shall be appointed by the President, annually, a committee of three, residing at or near the place selected for the next meeting, whose duty it shall be to assist the Executive Committee to procure rooms for meetings, and make such other local arrangements as may be needed for the Association.

VACANCIES.

SECTION 2. In case vacancies occur in the Committees or Officers of this Association by reason of absence from the annual session or otherwise, such vacancies shall be filled by appointment *pro tempore* by the President.

PUBLICATION COMMITTEE—HOW APPOINTED.

SECTION 3. The President shall appoint two members of this Association who shall act in conjunction with the Recording Secretary as the Publication Committee. The Committee shall be authorized to employ a sufficient number of competent reporters to furnish an accurate report of the proceedings of each meeting of sections, and of each general session.

ARTICLE XI.

INSTRUCTIONS TO THE PUBLICATION COMMITTEE.

SECTION 1. The Publication Committee shall superintend the publication and distribution of such portions of the transactions as the Executive Council may direct, or the Committee judge to be of sufficient value.

They shall specify in the annual report of this Committee the character and cost of the publications of the Association during the year, to whom they are distributed and the number of copies still on hand.

SECTION 2. Any report or other paper, to be entitled to publication in the volume of transactions for the year in which it shall be presented to the Association, must be placed in the hands of the Publication Committee in typewritten form within twenty days after the close of the annual session;

and must also be so prepared that the proof sheets furnished the authors shall be returned to the Committee without material alteration or addition.

SECTION 3. Every paper received and accepted by this Association, and all plates or other means of illustration, shall be considered the property of the Association, so far as may be necessary for the publication in the transactions of this body.

DISCLAIMER.

SECTION 4. The Publication Committee is hereby instructed to print at the beginning of each volume of the transactions the following disclaimer, viz.: "The National Dental Association although formally accepting and publishing the reports of the various sections, and the essays read before the Association, holds itself wholly irresponsible for the opinions, theories or criticisms therein contained, except when otherwise decided by special resolution."

ARTICLE XII.

SECTION 1. For the purpose of this Association, the United States shall be divided into three divisions, to be called the East, the South and the West.

The East shall include New England, New York, New Jersey, Pennsylvania, Ohio, Indiana, lower peninsula of Michigan and Ontario.

The South shall include Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, West Virginia, Georgia, Florida, Alabama, Mississippi, Louisiana, Texas, Kentucky, Tennessee, Arkansas, Oklahoma and Indian Territory.

The West shall include Illinois, Missouri, Wisconsin, upper peninsula of Michigan, Minnesota, Iowa, North Dakota, South Dakota, Nebraska, Kansas, Montana, Wyoming, Colorado, Idaho, Utah, Washington, Oregon, Nevada, California, Arizona, New Mexico and Alaska.

PLACE OF MEETING.

SECTION 2. The place of holding the next annual session shall be determined each year by ballot of the Association at its annual session, in the general session of the third day, except that the place of meeting shall be in the West in 1898, in the East in 1899, and in the South in 1900, and thereafter in the order named, meeting in each section every third year.

ARTICLE XIII.

ORGANIZATION OF SECTIONS.

SECTION 1. This Association shall be divided into three sections, as follows:

The first section shall have charge of prosthetic dentistry, crown and bridge work, orthodontia, metallurgy, chemistry, and allied subjects.

The second section shall have charge of operative dentistry, nomenclature, literature, dental education, and allied subjects.

The third section shall have charge of oral surgery, anatomy, physiology, histology, pathology, etiology, hygiene, prophylaxis, materia medica, and allied subjects.

SECTION 2. It shall be the duty of each member to identify himself with one or more of the above-named sections, and he shall inform the Recording Secretary of his choice at the time of joining the Association.

SECTION 3. The Secretary shall assign members to the sections in which they are expected to work if they shall fail to make their own choice before the close of the general session of the second day of the annual session.

SECTION 4. It shall be the duty of the Recording Secretary to keep a list of the members of the sections and to furnish copies of the same to the officers of the sections.

SECTION 5. The chairman of each section shall preside at all of its meetings; shall exercise general supervision over its business, and shall see that the labors of his section are so conducted as to secure the best results. In the absence of the Chairman the senior or junior past Chairman shall preside. (See Article VI, Section 6.)

SECTION 6. The Secretary of each section shall keep full and accurate records of the doings of his section, shall have charge of the stenographic reports, and report the same to the Recording Secretary each day, as soon as possible after their approval by his section.

SECTION 7. For information of all members a list of the names of members of sections shall be published in the transactions of each year.

ARTICLE XIV.

MEETINGS.

SECTION 1. The meetings of this Association shall be known as annual sessions, general sessions, and meetings of sections.

SECTION 2. The annual sessions shall begin on the first Tuesday in August of each year and continue four days.

SECTION 3. The general sessions shall be meetings of the whole membership in attendance upon the annual session and shall be held as follows:

The first general session shall convene at 10 o'clock on the first day and shall stand adjourned at 1 p. m., unless adjourned earlier. During this session the functions appropriate to the opening of the annual session may be performed, and the annual address of the President delivered.

On the second, third and fourth days the Association shall convene in general session at twelve o'clock, noon, and stand adjourned at thirty minutes past one, unless adjourned sooner.

SECTION 4. In the general sessions any member may introduce matters of business, if seconded, which must then be referred to the Executive Council without debate, provided that any member, opposed to such matter of business or motion, with a second, may call for a vote on such reference. A vote shall then be taken without debate, and if decided in the negative, that shall dispose of the matter for that annual session.

SECTION 5. The general session shall receive reports from the Executive Council as the first order of business, after the reading of the minutes, and shall approve or annul any matter of business or motions referred to it by the Executive Council by vote without debate.

SECTION 6. The election of officers of the Association shall be held at the general session of the third day of the annual session, and newly elected officers presiding over the general sessions shall be installed at the close of the general session on the fourth day, and those presiding over meetings of each section at the close of the last meeting of the section during the annual session.

SECTION 7. At the second and fourth general session there may be presented such addresses or reports as may be determined by the Program Committee, with the approval of the Executive Council, but these shall in no case occupy more than one hour of the general session.

SECTION 8. Sections 1, 2, and 3 shall each meet in separate rooms at 2:30 o'clock on the first day of the annual session for the reading and discussion of such essays, papers, reports, or for clinics, as may be determined upon by the Program Committee, with the approval of the Executive Council. Thereafter similar meetings of each section shall be held at 9 a. m. and 2:30 p. m. each day of the annual session. Evening meetings of the sections may be held as determined by each section.

SECTION 9. No business of any kind not strictly pertaining to the proper carrying out of the literary, scientific or clinical work of the sections shall be introduced or considered in the meetings of the sections.

ARTICLE XV.

PROGRAM COMMITTEE.

SECTION 1. The Committee on Program shall consist of the President, Secretary, the Chairmen of sections, and the two last past Chairmen of sections. It shall be the duty of this Program Committee to keep close watch over the progress of dental science and literature and to arrange with competent persons in the profession who are members of this Association, or with persons of known ability in closely allied subjects in science not members, to prepare and read or to discuss essays, papers, contributions, or perform such clinical demonstrations as will tend to the improvement of dentistry. It shall report to the Chairman of the Executive Committee what special preparations may be needed for carrying out the program that may be arranged or contemplated.

SECTION 2. The senior past Chairman, junior past Chairman and Chairman of each section shall, subject to the Committee, act as a Sub-Committee, having especial charge of the program of that section, the responsibility in this work being in the order named.

SECTION 3. The President of the Association shall be President of the Program Committee, or, when present, shall preside over meetings of a Sub-committee. The preparation of the program for the general sessions shall be under his charge. In meetings of the Program Committee, in the absence of the President, the senior past Chairman of sections present shall preside, seniority beginning with the division in which the President resides and following the order of rotation.

SECTION 4. The Recording Secretary shall act as the Secretary of the Program Committee and shall have charge of the preparation, printing and

the distribution of the programs. He shall announce at each general session the arrangement of the program for the next general session; and also the program for each of the sections for the next twenty-four hours.

SECTION 5. The Program Committee shall meet for consultation regarding the next year's work as soon as possible after the election of Officers, and hold such meetings thereafter on the call of the President or Secretary, as may be deemed necessary to the efficient carrying out of the work.

SECTION 6. The Program Committee shall report to the Executive Council at its first meeting on the morning of the first day of the annual session the program arranged for approval, and thereafter shall hold such meetings as may be necessary to arrange from day to day for the smooth working of the presentation and discussion of the matter of the program in the general sessions and meetings of sections.

ARTICLE XVI.

QUORUM.

Twenty members shall constitute a quorum in this Association.

ARTICLE XVII.

SUSPENSION OF RULES—THREE-FOURTHS TO VOTE.

The regular order of business may be temporarily suspended by a three-fourths vote of all the members present, for the consideration of a specific subject, upon the completion of which the regular order shall be at once resumed.

ARTICLE XVIII.

BRANCHES.

SECTION 1. For the wider diffusion of the benefits of this Association, the members of each division may form themselves into one or more separate bodies, to be styled "Branches."

POWERS AND OBLIGATIONS.

SECTION 2. Branches shall have such powers and privileges, and be subjected to such obligations, as shall be determined upon from time to time by the National Association in annual session.

SECTION 3. Each Branch shall be free to hold meetings and to govern itself as its members shall think fit, but no Branch law shall be valid which, in the opinion of the National Association, may contravene any fundamental law of the Association.

SECTION 4. Each Branch shall pay its own expenses, and no Branch shall be deemed for any purpose the agent of the Association, or have power to incur any obligation in its behalf.

SECTION 5. Each Branch shall furnish a copy of its proceedings, including papers and discussions, for publication with the transactions of the National Association.

SECTION 6. Each Branch may receive delegates from societies within its division upon the same conditions as the National Association, and such

delegates shall have the same standing in the National Association as though admitted directly from the state societies.

DUES.

SECTION 7. The annual dues of members attending the Branches shall be paid to the Branch Treasurer. Three-fifths of the dues may be retained for the benefit of the Branch. The remaining two-fifths shall be paid over to the Treasurer of the National Association.

SECTION 8. The annual session of any Branch shall be omitted whenever the annual session of the National Association shall be held in its division.

ORDER OF BUSINESS.

FIRST DAY.

8 A. M.—Meeting of the Executive Committee.
8 A. M.—Meeting of the Program Committee.
9 A. M.—Meeting of the Executive Council.
10 A. M.—Meeting of general session.
Report of Executive Council.
Report on Program for next general session and for each section for next 24 hours.
President's Address.
1 P. M.—Adjournment of general session, unless sooner adjourned.
2:30 P. M.—Meetings of sections for literary and scientific work.
8 P. M.—Meetings of sections for literary and scientific work.

SECOND DAY.

9 A. M.—Meetings of sections for literary and scientific work.
12 NOON—Meeting in general session.
Reading Minutes.
Report of Executive Council.
Report on Program.
Address, or Reports.
2:30 P. M.—Meetings of sections for literary and scientific work.
8 P. M.—Meetings of sections for literary and scientific work.

THIRD DAY.

9 A. M.—Meetings of sections for literary and scientific work.
12 NOON—Meeting in general session.
Reading Minutes.
Report of Executive Council.
Report on Program.
Selection of next place of meeting.
Election of Officers.
1:30 P. M.—Adjournment, if not adjourned earlier.
2:30 P. M.—Meeting of sections for literary and scientific work.
8 P. M.—Meeting of sections for literary and scientific work.

FOURTH DAY.

9 A. M.—Meeting of sections for literary and scientific work.
12 NOON—Meeting in general sessions.
Reading of Minutes.
Report of Executive Council.
Address, or Reports.
Installation of Officers.
Appointment of Committees.
Final Reading of Minutes.
Adjournment of the Annual Session.

AMENDMENTS.

The Constitution, Rules of Order and Order of Business of this Association may be altered or amended at any annual session by unanimous consent of the members present, providing notice has been given in writing at a previous meeting of the annual session at which the amendment is proposed; or by a vote of two-thirds of the members present, providing notice of the alteration or amendment has been given in writing at a previous annual session.

STANDING RESOLUTIONS.

The following standing resolutions are in force at this time:

1. *Resolved,* That a paper presented to the Committee on Voluntary Essays, and by them considered and returned to the writer with notification that the said paper is not accepted, cannot afterward be read before the Association unless it is made the special order by resolution adopted.

2. *Resolved,* That this Association discountenances the giving of banquets, excursions, entertainments, etc., by local professional societies or individuals, either during or at the close of our annual meetings.

3. *Resolved,* That it is unprofessional to use on cards or signs anything except name, title, and address.

4. *Resolved,* That this Association now in session direct that sections belonging thereto shall in the future be prohibited from inviting individuals who are violating the Code of Ethics to hold clinics or to give other exhibitions before this body.

5. *Resolved,* That a standing committee of three be appointed, to be known as the Committee on Termology, whose duty it shall be to prepare and submit a carefully prepared report at each annual meeting of this Association.

6. *Resolved,* That this Association believes the conferring of honorary degrees in dentistry to be detrimental to the profession of dentistry, and hereby expresses its disapprobation of the practice.

7. *Resolved,* That a committee of three be appointed by the chair to co-

operate with the officers in charge of the Army Medical Museum and Library in enriching its store of dental literature and specimens, especially by appealing to dental societies and individual members of the dental profession for assistance.

8. *Resolved,* That the National Dental Association condemns the use of secret preparations known as *"local anesthetics,"* as well as all other secret preparations.

9. *Resolved,* That the secretary or other officer of each society sending delegates to this Association is expected to make a general report of the work done by the society he represents during the year, giving the subjects of the paper read before them and digests of the same, and to send said reports to the Secretary of this Association at least three weeks before the date of each annual meeting; the reports to be forwarded to the Chairman of the section to which they belong.

10. *Resolved,* That any member of the dental profession who has been in reputable practice for a period of fifty years may be elected to permanent membership in the Association without payment of dues, and any member of this Association who has been in practice for a like period shall have his dues remitted thereafter by presenting the fact to the Treasurer of the Association.

11. *Resolved,* That lists of the ex-presidents of the American Dental Association and of the Southern Dental Association shall be published annually in the Transactions of the National Dental Association, and that all members and officers hold the same relations to the National Dental Association that they did to the former associations.

RULES OF ORDER.

1. On the arrival of the hour of meeting the President shall take the chair, call to order, and announce that the meeting is open for business.

2. No motion or speech shall be in order until the mover or speaker shall have been recognized and assigned the floor by the chair, nor shall a motion be open for debate until seconded and stated by the chair.

3. No one shall be permitted to address the Association before giving his name and residence, which shall be distinctly announced from the chair; nor shall he speak more than twice, nor longer than fifteen minutes in all, unless by consent of the Association.

4. At the request of any member a motion shall be put in writing.

5. At the request of five members a question shall be divided, or the yeas and nays ordered.

6. When a question is under debate no other motion shall be in order, except—1st, to adjourn; 2d, to lay on the table; 3d, the previous question; 4th, to postpone; 5th, to commit; 6th, to amend—and these motions shall take precedence in the order here stated.

7. The previous question, and the motions to adjourn, to lay on the table, and to postpone, shall be decided without debate.

8. A motion to adjourn shall always be in order, but no member can make such a motion while another is speaking or while a vote or ballot is being taken.

9. A second amendment to the main question shall not be in order until the first is disposed of, nor shall there be an amendment of an amendment to an amendment.

10. After a motion has been seconded and stated by the chair, it shall not be withdrawn without the consent of the Association.

11. No member shall interrupt another while speaking, except to raise a point of order.

12. When called to order, a member shall sit down until the point of order is decided by the chair, or, in case of appeal, by the Association. If the point of order be sustained, the member can proceed in order by the consent of the Association.

13. Every member shall vote upon a question unless excused by the Association.

14. When any motion, except to adjourn, has been rejected, it shall not be renewed without unanimous consent.

15. Any member who on a question voted in the majority may move a reconsideration of that question; but if that motion shall be lost or laid upon the table, it shall not be renewed without unanimous consent.

16. The President may vote with the members upon all questions, but having so voted, shall not give the casting vote in case of a tie.

17. Motions for filling blanks shall be put in the order in which they are moved.

18. On a division, or in voting by yeas and nays, any member may change his vote before the result is declared.

19. These rules may be suspended by unanimous consent.

CODE OF ETHICS.

ARTICLE I.—THE DUTIES OF THE PROFESSION TO THEIR PATIENTS.

SECTION 1. The dentist should be ever ready to respond to the wants of his patrons, and should fully recognize the obligations involved in the discharge of his duties toward them. As they are in most cases unable to correctly estimate the character of his operations, his own sense of right must guarantee faithfulness in their performance. His manner should be firm, yet kind and sympathizing, so as to gain the respect and confidence of his patients; and even the simplest case committed to his care should receive that attention which is due to operations performed on living, sensitive tissue.

SEC. 2. It is not to be expected that the patient will possess a very extended or a very accurate knowledge of professional matters. The dentist should make due allowance for this, patiently explaining many things which may seem quite clear to himself, thus endeavoring to educate the public mind

so that it will properly appreciate the beneficent efforts of our profession. He should encourage no false hopes by promising success when, in the nature of the case, there is uncertainty.

SEC. 3. The dentist should be temperate in all things, keeping both mind and body in the best possible health, that his patients may have the benefit of that clearness of judgment and skill which is their right.

ARTICLE II.—MAINTAINING PROFESSIONAL CHARACTER.

SECTION 1. A member of the dental profession is bound to maintain its honor, and to labor earnestly to extend its sphere of usefulness. He should avoid everything in language and conduct calculated to dishonor his profession, and should ever manifest a due respect for his brethren. The young should show special respect to their seniors; the aged, special encouragement to their juniors.

SEC. 2. It is unprofessional to resort to public advertisements, cards, handbills, posters, or signs, calling attention to peculiar styles of work, lowness of prices, special modes of operating; or to claim superiority over neighboring practitioners; to publish reports of cases or certificates in the public prints; to circulate or recommend nostrums; or to perform any other similar acts. But nothing in this section shall be so construed as to imply that it is unprofessional for dentists to announce in the public prints, or by cards, simply their names, occupation, and place of business, or, in the same manner, to announce their removal, absence from, or return to business, or to issue to their patients appointment cards having a fee bill for professional services thereon.

SEC. 3. When consulted by the patient of another practitioner the dentist should guard against inquiries or hints disparaging to the family dentist, or calculated to weaken the patient's confidence in him; and if the interests of the patient will not be endangered thereby, the case should be temporarily treated, and referred back to the family dentist.

SEC. 4. When general rules shall have been adopted by members of the profession practicing in the same localities in relation to fees, it is unprofessional and dishonorable to depart from those rules, except when variation of circumstances requires it. And it is ever to be regarded as unprofessional to warrant operations as an inducement to patronage.

ARTICLE III.—CONSULTATIONS.

Consultations should be promoted in difficult or protracted cases, as they give rise to confidence, energy, and broader views in practice.

In consultations that courtesy and just dealing which is the right of all should be especially observed.

ARTICLE IV.—THE RELATIVE DUTIES OF DENTISTS AND PHYSICIANS.

Dental surgery is a specialty in medical science. Physicians and dentists should both bear this in mind. The dentist is professionally limited to diseases of the dental organs and adjacent parts. With these he should

be more familiar than the general practitioner is expected to be; and while he recognizes the broader knowledge of the physician in regard to diseases of the general system, the latter is under equal obligations to respect his higher attainments in his specialty.

Article V.—THE MUTUAL DUTIES OF THE PROFESSION AND THE PUBLIC.

Dentists are frequent witnesses, and, at the same time the best judges of the impositions perpetrated by quacks, and it is their duty to enlighten and warn the public in regard to them. For this and many other benefits conferred by the competent and honorable dentists, the profession is entitled to the confidence and respect of the public, who should always discriminate in favor of the true man of science and integrity against the empiric and imposter. The public has no right to tax the time and talents of the profession in examinations, prescriptions, or in any way without proper remuneration.

NATIONAL DENTAL ASSOCIATION

SOUTHERN BRANCH

MEETING OF 1903

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ANNUAL ADDRESS.

The Parallelism of Social and Professional Evolution From the Individual's Standpoint.

By GEO. S. VANN, President.

Modern society is a vast organism full of conscious life and energy, in which each man bears a definite and vital relation to every other man, and is himself formed by the spirit of the age of which he forms a part. That this statement is not hyperbolic in its nature can be readily seen if we but pause a moment to reflect upon the highly organized civilization of to-day, in which modern transportation and communication have abridged distance and brought the remotest parts of the earth into close relationship. As a result the continents vibrate with swift communion of sentiment, the zephyrs waft intelligence from country to country, the waves roll it from shore to shore, and information is circulated in electric currents from nation to nation. Energy of mind, genius and power, wherever they exist, may speak out in any language and the world will understand, for the universe has become a common field for man to operate in, a market place for the exchange of intellectual discoveries.

These external conditions of society are patent to every mind, so much so that our very familiarity with them occasions us to doubt the frank statement of the sociologist, that the best of us are very ignorant of the inside facts of social life, that the majority of people have yet to be convinced that the study of society is important, and that only the exceptional few have realized, for example, that part of our own life is lived by people miles and miles away whose very names we have never heard. Because certain men in Montana or Australia have raised a particular breed of sheep, we are enabled to wear some parts of the clothing upon our bodies at this moment,

Those people have been dressing us for years while we have given scarce a thought to their existence. Who puts fork or spoon into our mouths at to-day's dinner? Not our hands alone. Some men have been raising wheat in Kansas and potatoes in New Hampshire, others have been boiling salt in New York, picking coffee in Java, and gathering spices in the isles of the sea; porters have carried burdens on their backs and loaded on drays, officials have inspected, merchants have sold, and domestics have labored—all in the course of setting our table. If these thousands of people in our own land or beyond the seas should stop living and working, great sections of our own life would cease, for we human beings are what we are and enjoy what we do because we are parts of a complex social whole.

Again, few people have ever reflected that a part of their lives was lived a decade, a century, a millennium ago. Our life is not all to-day and to-morrow. Its yesterdays are just as really a part of it as are any of its present moments. Society is like Tennyson's brook, as, of course, the poet meant for us to interpret his lines—society, too, goes on forever. People are the bubbles on the surface of the brook, but each bubble is a part of it. Each is what it is because of the bed which the brook has been ages in wearing; because of the course of the brook to the spot where the bubble was formed; because of the soil on the bank; the force of the stream; the sunshine or cloud in the sky. In plain prose, our lives, ourselves, are atoms of the life of humanity that has been working to form us through all ages.

Suppose one of us should have been cast in early childhood upon a Robinson Crusoe's island. Suppose the waif were bare, without tools, without provisions. He would not be then entirely uncultured or absolutely unskilled. He would carry rudimentary civilized tastes and the beginnings of social traditions. Cut off from the body of that tradition, however, he would not come into his inheritance as an heir of the ages. He would have to begin where primitive man began and live the fragmentary life that all men had to live before life upon life had accumulated facilities and capacities for living. He would have to learn everything about the resources of nature and their uses. He would have to acquire all the arts and crafts and mysteries by which the world's workers have wrought over raw material for human uses. Thrown back upon the necessity

of doing all his living for himself, he would need thousands of years to acquire the tastes, develop the wants, and learn the skill to provide for himself the food, clothes, tools and comforts that the ordinary civilized man requires. Therefore, in our brief term of existence, we have much larger life by being sharers of all past life.

What is true of the individual life has a thousandfold larger meaning when applied to national life. Take for example this continent, a wide republic, the youngest member of the great family of nations. Its history runs back to the postdiluvian period when the great Aryan family began to stir itself in the early morning of the world for that great westward movement in the course of which empires, kingdoms and republics were founded. Standing as it does, the last of this long and majestic line of governments, the American republic has the advantage of profiting by the failures and successes of all the systems that have vanished, and of making a part of its own vital organism those elements which have added to the greatness and perpetuity of its predecessors.

Washington, the capital city of the nation, has been made the visible embodiment of these elements. In her congressional halls centralized national power is evenly balanced by the representative rights of sovereign states, thereby securing peace, order, equity and freedom to all within the nation's boundaries, and shedding light, hope and joy upon the pathway of human liberty throughout the world. Long may the noble city endure, as the ever-living monument of constitutional liberty, so that in the fullness of time the prophet-statesman's famous dream of the political union of the American continent under one flag, with one speech and a common jurisprudence, may be fulfilled, and the islands of the sea which have come under her dominion may be made to rejoice that they have become stepping stones toward the entrance of the United States into world politics.

Summing up these thoughts in their relation to the present and future, we are happy in being permitted, under circumstances so auspicious, to assemble within the gates of the capital city, and under the inspiring influence of associations historic and patriotic address ourselves to the study of those social forces which have formed us and our opportunities, trying to learn thereby how to take a little wiser look into the present situation, and how to calculate the possibilities of life a little more broadly and deeply,

When we lift a corner of the veil which hides from us the primitive condition of mankind we find that human relationship or society had its origin in the family life. And as the care of childhood lengthened—where several children were successively born to the same parents—the ties between father and mother, sister and brother, became firmly knit, affording opportunity for the growth of the sympathies and the development of the reciprocal duties between the various members, and the judgment of action as good or bad by some other standard than selfish desire.

The rudimentary growth of the moral sentiments having in this way been given definite direction, they began to play an important part in the progress of society, scarcely keeping pace, however, with the general development of intelligence and quick-wittedness, for the reason that the advancement of civilization has been largely effected through strife, through the continuance of that deadly struggle of natural selection which has been going on ever since organized life first appeared upon the earth.

This can be easily understood when we remember that with primitive man food was the prime necessity of life, and as long as food was obtainable only by hunting and fishing, or otherwise seizing upon edible objects already in existence, chronic and universal quarrel was inevitable. This condition meant everlasting slaughter, and that the fiercest race of fighters would survive and perpetuate their kind, but in the midst of this strife there was one exception—the family life supplied the motives of peaceful cooperation. Within its limits interdependence, fidelity and forbearance had their uses, for events were not long in showing that the most coherent families would prevail over their less coherent rivals. Thus the family became the organized unit of society, and in time secured a determinate development for that class of human emotions, sympathy, and the concomitant altruistic or ethical feelings, which could thrive only through the elimination of strife. Evidence of the universality of this fact is seen in the later history of mankind, which during the past thirty centuries has been characterized by gradual cessation of strife, although the process has gone on with such extreme slowness that at the present day it is only by surveying human history from the widest possible outlook that we are enabled to distinctly observe the tendency.

However, in speaking of the higher ethical feelings as being an-

tagonistic to the continuance of warfare, it is not meant to imply that warfare could ever be directly overcome by horror of cruelty or moral disapproval of strife. The actual process is much more indirect and complex, as will be seen by the following steps towards civilization. Sensation and experience were the only sources of primitive man's mental evolution, but by the constant exercise of his wits in the struggle for existence he was presently enabled to devise other and better methods of obtaining food. During intervals of peace families grouped about a common ancestry, and sojourning in a fertile region, learned to till the ground and rear flocks, and when they proceeded a step further and exchanged the products of their labor with one another, a new and profound movement was made toward a higher social state. Whereas, the only conceivable bond of political combination had heretofore been blood-relationship, a new basis was now furnished through industrial activity, commercial exchange and contiguity of territory. Food supply was no longer necessarily a bone of contention, for it could be indefinitely increased by peaceful industry, and furthermore, in the free exchange of the products of their labors it ceased to be true that one man's interest opposed another's. Of course men did not at once recognize this fact—indeed, they have not universally as yet, so accustomed are they to interpret the conditions of life in accordance with the traditions handed down "from time immemorial, when the means of subsistence were strictly limited and one man's success meant another's starvation"—but the series of changes toward industrial civilization had set in, and the tribes or clans who earliest learned the value of community of occupation were not long in overcoming their neighbors and flourishing at their expense, for agriculture, aside from supplying resources, allows a vastly greater population to live upon a given area, and in many ways favors social organization.

Bearing these facts in mind, it may be interesting to note the rise of the priestly class as the origin of the intellectual element in social progress. The idea of religion is recognized as coordinate with human development, and that devotees of the altar might spend all their time in ministrations to and propitiation of the tribal divinities, the remainder of the population began very early to supply them with the means of subsistence. Not being called upon to work for a living, the primitive priest had full opportunity for the acquirement of cunning and skill, and that acquaintance with the nature of

things which gave him the ascendancy over his fellows. Since his power as priest was greatly increased by the exhibition of those feats and products which exceeded the understanding of the people, he was under a constant stimulus to gain the superior culture and mental power requisite for their performance.

Hence the impulse given to intellectual labor and discipline which has come to distinguish the professional callings as such from other occupations. When we come to consider the professions separately, we find that of medicine was largely in the hands of the medicine-man of the tribe to begin with, who through pretended connection with supernatural beings claimed the power to charm out diseases and evil spirits, and to ascertain by suggestive means who was responsible for criminal acts, thus blending his with the priestly character and fixing the status of medicine as an intellectual calling. Alongside the medicine-man, however, there grew up a rude medicine which was engaged in by both men and women who were dependent upon their knowledge of the healing virtues of plants and herbs, and so were more in line with scientific medical practice. With the natural development of knowledge in a growing society the medicine-man who continued to work on the suggestive basis was gradually displaced by the lay specialist who, operating on scientific or empirical principles, laid the practical basis of the profession of medicine in all its branches.

Such were the beginnings of civilization, in which the industrial, ethical and intellectual forces were given definite direction, and out of the exigencies of which, continually increasing in complexity, have proceeded, directly or indirectly, all the arts and sciences which have given to modern life so much of its interest and value. But more important still has been the consequent development in the ethical field. Industrial activity having furnished a wider basis for political union than mere blood-relationship, the area within which moral obligations were recognized as binding was proportionately enlarged. At first confined to the family, then to the tribe, the idea of duty came at length to extend throughout a state in which many tribes were combined and fused, and as it thus increased in generality it became immeasurably strengthened and ennobled.

This coalescence of small groups of men into larger and still larger political aggregates marked the rise of the ancient empires and was the key to further human progress. Advancement along this

line was made under unspeakable difficulties, due to the fact that the principles of national life were being evolved one by one out of the depths of human experience, each civilization being but an expansion of one of these elementary ideas. Egyptian greatness, for example, was built up about the idea of material aggrandizement, to which fact the colossal ruins on the upper and lower Nile bear silent testimony even unto this day. The Jewish civilization was a result of religious inspiration; the Greeks emphasized culture, the Romans law or government. Elsewhere you meet with other organizing principles which in turn determined the order of civilizations, but everywhere such development was one-sided and brought monotony in its train. To this cause may be attributed the character of tyranny which appeared among all ancient governments. Society belonged to an exclusive power which would permit the existence of no other. Every differing tendency was proscribed and hunted down. Individual life consequently counted for nothing. Education and training aimed not at the development of a perfect man or woman, but to prepare subjects for their places in the established order of things. This sacrifice of the individual to an external, despotic authority which controlled his destiny, together with the method of national growth by conquest of neighboring tribes without admitting them to a share of the government—a mere robbing them of their military strength and the fruits of their labors—brought together a mass of human beings virtually enslaved. Such states degenerate rapidly in military strength. Their slavish population, accustomed to being beaten, starved and massacred by the tax-gatherer, loses all courage and patriotism. To strike down the executive head of such an assemblage of enslaved tribes is to effect their conquest or dissolution. Hence the history of ancient peoples is characterized by sudden and gigantic overthrows.

Rome was the last exponent of ancient civilization, and by her conquest of the known world she was enabled to gather upon her seven hills the sum total that remained of the religions, ethics, laws, customs, languages, arts and sciences of all nations of antiquity which had successively held sway or predominance. Therefore, as we approach the decline and fall of this great empire, due partly to the overwhelming invasion of barbarian hordes and partly to internal decay, it would seem that the channel of progress would

suddenly disappear like an underground stream, and its very source be lost in the turmoil and darkness of the ages following.

Not so, however, for just as the empire reached its zenith of power, and peace prevailed throughout the world, an event occurred that has thrilled all successive ages—the Christ was born in Bethlehem of Judea. This event was unheralded at Rome, but it was filled with profound significance for that world-power in which might meant right, for He came teaching the value of the individual as a unit of service to and salvation of the race, and summed up all human relations and ethical codes in the simple formula: "Do unto others as you would be done by." The influence of such an idea as that of the Divine-human God condescending to assume the sorrows and trials of mortal life, all for the sake of the elevation of individual souls, the humblest and weakest as well as the mightiest and most exalted, was indeed potent to transform civilization, and this consideration for the individual in his imperfection has acted as a permanent cause to effect the relation of the directing and controlling powers in human society to the masses beneath them. Henceforth the whole policy of the institutions of civilization—family, state, church—becomes more and more one of tender nurture and development of individuality as the highest object to be sought by humanity.

We must not understand this progress to have been uninterrupted in its course, for the early society of Christian believers, centralizing itself in the heart of the Roman Empire, soon began to partake of the nature of that government, and to such a degree that by the close of the fifth century Christianity was no longer a religion of individual belief, but the organized church of Rome, with a pontifical head, constituted clergy, mediatorial priesthood, revenues, means of independent action, and national and provincial councils.

But the church as such had its mission to fulfill. It is clear that a society strongly organized and strongly governed was indispensable to struggle with the overwhelming disaster of the falling empire and to issue victoriously from such a wreck. It is clear that the church of Rome alone could have gathered up and preserved within its cloisters the relics of ancient civilization, and, having conquered the invading barbarians by converting them, become the bond, the medium, the principle of civilization between the ancient and modern worlds.

This transfer of political power, and gradually of social and in-

tellectual precedence, from the law-abiding Roman to the freedom-loving Teuton extended from the Fifth to the Fifteenth centuries, marking the character of the Middle Ages as preeminently transitional. It was the kindergarten period of the great nations of modern Europe, during which ancient reverence for imperial majesty still obtained, but the latter was offset, through the rise of the feudal order, by a vast extension of the range of social and industrial activities in those directions where adjustment to environment was felt to be least complete, thus leading up to the crowning historical event of an evolution of a thousand years—that of the revival of learning. This intellectual movement, beginning among the upper strata of society, worked downward until it reached the people, developing in each nation a distinct and characteristic phase. In Italy thought turned to art; in France to philosophy; in England to literature; in Spain to exploration, resulting in the discovery of a new world for civilization, and in Germany, where the printing press had made the Bible the book of the people, the Reformation followed, bringing the individual back to a sense of his personal relationship to God, as taught by the Founder of Christianity, and making the great protestant declaration of the "divine right of private judgment."

Stimulated and emancipated by greater intellectual freedom of inquiry in religious matters, men began to scrutinize and discuss the whole theory of government, and they grew restless under the arbitrary rule of earthly sovereigns as their minds rose to the conception of their supreme obligation to a higher law; to a power above the will of king in the state and of pope in the church. But the natural growth of the people toward greater political and religious liberty was met by formidable opposition, both on the part of church and state, the former entering upon a series of cruel persecutions and martyrdoms, the latter flaunting the "divine right of sovereignty" in the face of an exasperated populace. The people of the Reformation, however, were in no mood to hear of any right divine to compel the individual's conscience and the individual, having encountered two centuries of religious and political storm and stress, had emerged strong enough in the consciousness of his rights to assert them. He had faced the universals which had commanded his respect—the church and the state—and in searching out their majesty had become conscious of his own. Out of this

passionate sense of the worth and dignity of manhood and the growing conviction of human brotherhood came the blood and violence of those social upheavals which ushered in the modern democratic era. Men were possessed with a fever for the rights of man, they dreamed of the wholesale reorganization of society for his benefit and the coming of an idyllic Golden Age. This could never be realized in the old world bowed down with superstition and intolerance. Hence the era of colonization set in, directing the mighty ocean current of religious and political freedom from the shores of Europe westward until it washed the coast of the new world and channeled its way from sea to sea across its broad expanse.

Many things were uniting at this time in an imperative demand for the speedy civilization of the new world. Besides the further development of the individual and the expansion of the race, the growth of commerce called for it; the awakening of new thought and genius solicited it; the advancing sweep and sway of christian ideas necessitated it. Never before in the history of the race had there been so imperative a demand. We do not speak of the ambition of an Alexander or a Cæsar which sighed for new worlds to conquer, but of the legitimate needs of a growing, advancing humanity.

In response to this demand the settlers of the new world, the founders of the American Republic, came, bringing with them four great ideas to be worked out in the new civilization—government, material prosperity, religion, and culture. Government in their minds naturally took the form of a democracy in which all men were free and equal; and democracy formulated itself in the Declaration of Independence, the Constitution of the United States, and the institutions of a representative self-government.

The free-play of those voluntary activities appropriate to a developed individuality having been definitely secured, man now concentrated his powers upon the conquest of his material environment. As a consequence the spirit of industrialism and commercialism dominated all the activities of the past century, but the extraordinary progress of invention, the application of machinery to wealth production, and the rapid increase of cheap transportation facilities, developed entirely new economic conditions. As a result we have enormously increased capital and production, the concentration of

large masses of people in cities, the growth of social, professional, and commercial organization, and the combination of labor and capital. The vast industrial development of the nineteenth century was based on individualism, but its results and tendencies have been distinctly social, its progress consisting in having laid material foundation for the development of the race through social and economic organization.

Thus one century prepared the way for advancement in the next, and scholars, recognizing the orderly sequence of history in the passing from industrial development to the ethical adjustment of human relations thereto, and believing that man had reached a point where he could plan out and create for himself a higher type of civilization, set themselves to making independent investigations of social conditions and relations, with a view of getting behind popular notions, conventional ideas and metaphysical speculation, to the actual facts of social life and of then arranging these facts in a systematic way after the truly scientific fashion. This was the beginning of a new science, that of sociology, which has a threefold object: (1) To find out what the actual social world is. (2) To discover the real social world that ought to be. (3) To reveal the ways and means of changing the actual into the ideal. As a basis for this social philosophy Prof. Albion W. Small has reduced human welfare to six essentials, health, wealth, sociability, knowledge, culture and righteousness. When we consider that every individual is a more or less highly organized demand for these satisfactions, and that all associated life since the mating of the first pair down to the establishment of the republican form of government has been first an instinctive and then a deliberate effort to meet these requisitions, it is plain that the solution of the foregoing social problems is the great task which has been laid upon the present epoch of the world's history.

The dental profession in its relation to the public health is one of the factors of the great social process, the laws governing its development working in harmony with and being as fixed as those determining social evolution. In support of this fact Herbert Spencer has said: "One of the conclusions at which we arrive is, that in every branch of knowledge we must proceed from the empirical to the rational, a leading fact in human progress being that every science is evolved out of its corresponding art. It results

from the necessity we are under both individually and as a race of reaching the abstract by way of the concrete, that there must be practice with an accruing experience, with its empirical generalizations, before there can be science. Science is organized knowledge, and before knowledge can be organized some of it must be possessed." Every science should therefore have a purely experimental introduction, and only after an ample fund of observation has been accumulated should reasoning begin.

Such was the history of dentistry from the gathering of the first herbs by primitive man, when medicine was still connected with the priesthood, to the treatment and restoration of the teeth, which became a specialized art coordinate with ancient civilization. After the fall of Rome, however, the curative art, following the course of events, together with learning and the sciences sank to the level of the invading barbarians. Here again we find the healer closely associated with the priest, following his lead in excommunicating recusant members, until better counsels prevailed and redemptory methods were adopted. In the church came discipline and rectification instead of exclusion and abandonment, and on the part of the healers treatment of organs and parts instead of amputations and excisions, and in contagious diseases seclusion and care instead of banishment as unclean and therefore unworthy of help and sympathy.

After the lapse of the Middle Ages there was merged out of the rule of priest and king—holding sway as by divine endowment—the classified order of the professions: Divinity, law and medicine. Then followed the specialization of medicine, which movement was in harmony with the developments of the centuries succeeding the Revival of Learning, the intense individualism of the eighteenth century being pertinently illustrated by the attitude of the practitioner of dentistry, who isolated himself and labored behind closed doors both as operator and teacher, undertaking the latter work only for large fees and long service. In time competition arose upon this point, reducing the term of pupilage and compensation demanded, until certificates of qualification were granted after a few days "devoted to the copying of recipes and handicraft tricks," in the back room that served as workshop and college. Charlatanism and incompetency naturally resulted, and the professionally inclined practitioners of dentistry were led to attempt the establishment of

a department in a medical school. This privilege being denied them, those pioneers, having a common interest and therefore a common principle of action, associated themselves in securing a charter for an independent dental school, thus opening the way for the organization of the dental society and the publication of the dental journal.

Since this important declaration of independence, which act was also strictly in accordance with the spirit of the times, being the second made upon American soil within half a century, the progress of dentistry has been synonymous with the material progress of the nation. An era of research, invention, and discovery set in whereby we as members of the profession have had our powers immeasurably increased. We use better instruments, work with more ease, operate more rapidly, see more clearly, understand more thoroughly, cause less pain, and are enabled to preserve those organs the lesions of which called the dental profession into existence. But as important as these results are, they are not the chief reason for congratulation. Through intellectual activity the province of the profession has been enlarged, its capacity multiplied, a scientific basis furnished, and the members having risen in the scale of being are prepared, by the partial organization of their forces, to pass out of the narrow ruts of individualism into the broad professionalism of the dawning century, thereby keeping abreast with the ceaseless march of societary progress.

That a movement so cosmic in significance has grown out of the organization of local, state, national and international bodies, the object of which is to "sift out and correlate the best factors of professional life, with the purpose of unifying them into the highest ideal," is deserving of our profoundest consideration. Therefore as we approach the date of the Fourth International Dental Congress, to be held within the year, it is the duty of every member of the dental profession in America to regard the meeting not only as one in which he has a personal interest, but as one which involves also a personal obligation, to contribute of his ability, means and time towards its success. Furthermore, it is an occasion that transcends individual interest, and should therefore be made fruitful to the general good by a union of our forces for the advancement of scientific and professional interests, and for the display of that American hospitality due the representatives of an international

congress, thus characterizing the meeting by a spirit symbolic of "the harmonization of the world's dental activities" toward which we progress.

This idea of association for unification as applied to progress in dentistry is the leaven which is at the basis of the present activity observable throughout the dental profession of the world today. Toward this end the closing years of the last century witnessed in this country the organization of the National Associations of Dental Faculties and Dental Examiners, the Institute of Pedagogics, and the amalgamation of the American and Southern into the present august body, the National Dental Association.

Before these bodies are already arising problems growing out of the ethical adjustment of professional life to the industrial development of the past century, namely, the unification of state dental laws, dental examination for life insurance, appointment of dentists in the army, the higher training of the dentist as a member of the profession and society, and popular education with respect to oral hygiene. Never within the history of dentistry has there come to the members of the profession so fruitful an opportunity for social service on a large scale as is offered by these movements on behalf of the public and the profession at large, failing to accomplish which we would fall far short of the twentieth century standard of our possibilities. Therefore as members of the Southern Branch I recommend that we put ourselves on record as favoring any definite action taken by the National Dental Association along this line, pledging our loyal support individually and collectively, both at home and in the congress of our fellows.

I also recommend that the constitution and by-laws of the Southern Branch be so amended as to correspond with those of the National Dental Association, and that a sufficient number of copies be printed and distributed among the members of this association, in order that they may become conversant therewith. I furthermore recommend that a program committee be created and added to the list of standing committees.

As has been observed, the tendency in the social world today is to emphasize the individual as a member of society, as an institutional being, and as such in sympathetic touch with all mankind. The same is true in professional life. Hence it is of vital importance to the purposes of this Association that every practitioner of

dentistry within its jurisdiction should accord to it his loyal support and cordial cooperation. Statistics are not accounted interesting reading, but if their interest were at all commensurate with their significance the fact that out of a little less than 30,000 dentists practicing in the United States a little more than 25,000 hold no associational allegiance—men of our own profession and traditions—would dwarf all others in importance. Let us at least bear in mind the figures which express the percentage of unorganized material within the limits of this and our respective state associations. Let us watch the decrease of this percentage, for these figures express the relation of light to darkness, of progress to decadence. With these figures constantly before us there will grow a clearer conception of what is to be done, and a more insistent determination through organization to bring out of the individualism, industrialism, and commercialism of the past century the noble order of cooperation as a profession in the service of humanity.

Social organization is a still further test of progress; it is a great conscience builder. Ability and technique are the mainstays of dentistry, but the ethical spirit of the society and association is the medium through which our profession has grown from "a mere adjunct of a trade to a body of men having the highest sense of loyalty to the profession, regard for each other, and duty to their fellow men." And now, whether we realize it or not, in many strange ways, by the alliance of nations, by armies and navies, by federations, unions, and trusts, by the growth of world politics and international arbitration, we are being taught the larger meanings of associated life, even the possibility of gaining a unified view of the world's progress, and the consequent recognition of that universal moral standard, whereby the individuals of the ever-increasing aggregates of mankind may have a just proportion of those cardinal satisfactions in life essential to human happiness and welfare.

Therefore when we pause a moment in the effort to visualize all past human activities in a perspective corresponding with reality, and consider that human life is interchange and interaction of all lives, we get a view of the world that turns out to be the theater of a plan of salvation far more sublime than the imagination of man ever conceived. The potencies which the Creator has put in men are finding themselves in the summary of human experience, and now

with the accumulated wisdom of half a hundred centuries, with the functional organization of society, and the sympathetic cooperation of enlightened peoples, mankind is entering upon a social career prophetic of that age

"When the war-drum throbs no longer and the battle flags are furled
In the Parliament of nations, the Federation of the world."

Report of the Committee on Oral Hygiene.

By J. E. CHACE, D.D.S., Ocala, Fla.

As to the breadth of field involved in the term oral hygiene, it is believed that few of us realize the extent to which it ramifies throughout almost every question relating to dentistry. All branches and phases of our work have their bearing on the health of the oral cavity, and through that cavity on the health of the entire body. As is implied in the foregoing sentence, oral hygiene is itself but a small division of general hygiene, and the dividing line between them is necessarily indistinct and illy defined, for it is impossible to treat of the health of one organ or part, as distinct from that of the organism in general, existing as there does such an interdependence between all the parts. Your chairman makes these remarks in part as an apology for what may be criticised as the bringing into this report of matter irrelevant to a report of the Section on Oral Hygiene.

It is our pleasure to report that the past two years have been unprecedented in the activity of our profession along the lines of oral hygiene. Never before has the importance of prophylaxis been so thoroughly appreciated by the profession; never before have questions relating thereto been so frequently and thoroughly discussed before our societies; never before has the operation of cleaning the teeth, with its accompaniments, been so faithfully carried out at the chair. Not that conditions are as we might desire them, but the present activity is certainly a most important index, pointing with no uncertain meaning to greater things in the future, and possibly at no distant time to such a perfection in the ways and means of preventive dentistry that all those who place themselves in

competent hands and conscientiously carry out instructions will be freed from dental caries and those often greater evils which follow septic conditions of the mouth.

Our profession in particular and the public in general owes an undying debt of gratitude to those men who are devoting themselves to this great work. That we have men in our profession who are proving themselves equal to the task, when necessary, of cutting new paths in the field of general pathology and etiology, is in itself a commentary on the present status of dentistry, as is the wideawake state of so many of the profession as regards the scientific aspect of those conditions with which they are called on to grapple.

For the purpose of classification, and thus facilitating the consideration of this report, we have divided it into the following heads—*First.* Oral hygiene as affected by etiological factors. *Second.* The unhygienic mouth as bearing on systemic infection. *Third.* Oral hygiene and prophylaxis as an operative measure. *Fourth.* Miscellaneous questions relating to oral hygiene, not considered under the foregoing heads.

First. Oral hygiene as affected by etiological factors.—We take it as a truism that the last chapter on oral hygiene cannot be written until all questions relating to the etiology of caries, pyorrhea, and the other diseases to which the oral cavity is subject are settled and placed on a fixed scientific basis. It is also true that each step toward a better understanding of the etiology of these diseases places us that much nearer the goal of preventive dentistry. Until these causes, both active and predisposing, are understood, we must work more or less empirically, and a national theory of prophylaxis cannot obtain. Our advance during the past year in etiology has been both constructive and destructive. Constructive in the addition of new facts, and destructive in the overthrowing of conclusions which had been based on insufficient data. The researches of Kirk might be classified under the first head, those of Miller principally under the second.

In Kirk's paper on "The Predisposing Factor in Dental Caries" (DIGEST, August, 1903, p. 968) we have an able appeal for the consideration of the importance of the constitutional factor in immunity and susceptibility to dental caries. In pointing out the failure of our prophylactic treatment as now practiced he says, "All the minutiæ of the dental toilet, the cleaning of the tooth surfaces and

the buccal mucosa, and the application of buccal antiseptics, etc., are effective only in proportion to the persistence with which they are exercised, while the persistence of bacterial influences is practically a constant factor. Eventually the constant factor must produce its results when combated by the necessarily intermittent one of local hygiene and antiseptics. We must then seek some method of prevention equally as persistent as the bacterial influences." Further he says, "The conditions which in a strict sense produce susceptibility to dental caries are but little known, while those which enter into the problem of immunity are still less understood. Certain results, however, have been obtained which are at least significant that the composition of the saliva exerts a most important influence upon the causation of caries." The important conclusion is reached, through experimental research on the mixed human saliva by means of the micropolariscope, that all cavities found in the teeth are not the result of the action of microorganisms, but that in many cases where there is a rapid dissolution of tooth structure the effect is produced by the action of sodium acid phosphate, which is contained in the saliva probably as a result of faulty metabolism. Thus we have a corroboration by exact methods of research of the prediction of Michaels in 1900.

In another paper by the same author on "The Saliva as an Index of Faulty Metabolism" (DIGEST, September, 1903, p. 1126) we have a report of experiments and conclusions drawn therefrom relative to the condition of faulty metabolism as an etiological factor in certain oral lesions, such as dental erosion, pyorrhea, probably dental caries, etc. This field of research promises great things in the way of clearing up our ideas of etiology, and Kirk has here shown us how the hyperacid diathesis acts in producing that form of erosion which manifests itself in localized erosions upon certain surfaces of the teeth, and which has long been recognized as due to the abnormal acid secretion of certain mucous glands. The paper is concluded with a statement, the truth of which is beginning to be recognized, namely, that good health is the best guarantee against bacterial invasion, and that it is faulty nutrition which is mainly the prodromal condition of infection. The building up of the natural body defenses by establishing conditions of nutrition is not only the true prophylaxis, but it is very evidently the only rational basis of therapeutics.

In a third paper, entitled "A Contribution to the Study of Metabolism" (DIGEST, December, 1903, p. 1488), is reported the discovery, by means of the micropolariscope, of oxalic acid as sodium oxalate in the urine in the earlier stages of oxaluria. Kirk believes that this salt always appears in the earlier stages of those cases, the advanced stages of which are characterized by the appearance of oxalate of calcium in association with other phenomena indicating a faulty metabolism. Lactic acid in combination as calcium lactophosphate and calcium lactate was also found in two cases of typical malnutrition. Kirk says that, "These faults of metabolism are productive of lowered vitality in two ways—first, by depriving the organism of that benefit which results from the normal nutritional process, and, second, by producing toxic waste products which accumulate in the blood and still further depress the vital resistance of the cellular elements, creating thereby a vicious nutritional circle. It is these two factors—tissue starvation and autoinfection—which seem sufficient to account for the lowered vital tone which renders the individual vulnerable to the invasion of those disease-producing bacteria which under normal conditions of nutrition are for the most part harmless."

In the *International* for June is given a review of a paper by Dr. Michaels on "Saliva as a Natural Protection Against Caries." The position is here taken that the saliva exerts a protective influence in three ways—First, mechanically, in that it washes away injurious substances; second, by neutralizing and diluting acids produced in the mouth; and third, by the antifermentative action of the sulfocyanid of potassium contained therein. As a result of analyses of the saliva, this author claims it is proved that where there is an increased amount of carbonates, phosphates and calcium in the saliva there is less caries of the teeth than where the saliva contains less of these substances which establish its alkalinity. He claims it is further established that persons suffering from neurasthenia and anemia have no sulfocyanic acid in their saliva, and it is well known to what an extent these patients suffer from caries. The use of tobacco is said to produce an increase of sulfocyanic acid in the saliva, and thus we find a reason other than its antiseptic action, which was established by Miller, showing how tobacco tends to lessen caries. The author also holds that it is possible to increase

the amount of sulfocyanic acid by internal medication and thus attack caries through systemic prophylaxis.

Miller has presented us with three very important papers during the year on the question of immunity (DIGEST, June, 1903, p. 708). They represent a great deal of work, being a record of extended experimentation. Coming from such a quarter these investigations carry with them much weight, and his conclusions being in direct opposition to those arrived at by others adds importance to their consideration. His conclusions are: 1st. The mixed human saliva, whether filtered or unfiltered, in its normal state or condensed by evaporation over water bath or at the temperature of the human body, does not possess the power to prevent or retard processes of putrefaction or fermentation. 2nd. Potassium sulfocyanid does not possess any appreciable antiseptic action in the greatest strength in which it is found in the human mouth. 3rd. Growths of bacteria and fermentative and putrefactive processes take place in oral mucus quite as readily if not more so than in the mixed saliva of the same person. 4th. The saliva of immunes develops in the presence of carbohydrates a little less acid on the average than that of highly susceptible persons. The difference is, however, not constant and not sufficiently marked to account for the great differences of susceptibility. 5th. Free acids produced by fermentation make their appearance in strongly alkaline saliva (as that of the horse) much later than in human saliva. 6th. The protective bodies (alexins) of the blood do not under normal conditions pass into the saliva in sufficient quantities to be detected by ordinary means. 7th. The struggle for existence probably plays an important role in protecting the mouth and the organism in general against the invasion of pathogenic microorganisms. 8th. Bacterial plaques are not essential either to the beginning or to the progress of caries, nor does their presence necessarily result in the production of caries. It is possible that they may intensify processes of decomposition in particles of food clinging to the surfaces of the teeth. 9th. The protective powers present in the human mouth are not to be accounted for by any antiseptic action on the part of saliva, but rather by the phenomenon of phagocytosis, by the struggle for existence, and probably by certain forces residing in the soft tissues which have not yet been investigated. 10th. Viscid, stringy saliva appears to exert an influence on immunity largely or wholly through its effects

on the self-cleansing process. 11th. There is no fermentable carbohydrate naturally in the saliva under normal conditions in sufficient quantity to materially influence the origin or progress of caries.

Second. The unhygienic mouth as bearing on systemic infection. —Like other questions relating to oral hygiene, this phase of preventive dentistry is growing in importance as the facts connected therewith become better known, and they are being clearly and forcibly brought to the attention of both the medical and dental professions by such men as Dr. D. D. Smith, Dr. Samuel A. Hopkins, and others, and with these champions such a cause cannot long remain in the background.

Dr. Smith in reading his paper on "Systemic Infection Due to Natural Teeth Conditions" (DIGEST, April, 1903, p. 397) has placed society very much in his debt for showing up that veritable cesspool, the unclean human mouth, in its true light as a causative factor in systemic infection. The matter in this paper is considered in general from the standpoint of the clinician and will no doubt do much good. We agree with Dr. Smith that a full recognition by the medical fraternity of the dangers which lurk in septic conditions of the mouth will do much toward a betterment of same.

Dr. Hopkins in his paper on "The Medical Aspect of Dental Lesions" (DIGEST, November, 1903, p. 1343) has made a notable contribution to the literature of the subject. It is an able appeal for greater consideration of the neglected field of constitutional disturbances due to septic conditions of the mouth, followed by a report of extended laboratory research on three of the most important pathogenic bacteria of the human mouth—staphylococcus pyogenes aureus, micrococcus tetragenus, and micrococcus lanceolatus. This article is full of important points, but we would call particular attention to the results of the experiments with the microorganism of pneumonia. It was found that mouth cleanliness would cause a disappearance of this microbe in many cases, and prophylactic treatment, when it did not destroy the microbe, would render the saliva which contained it non-pathogenic. To use his words, "We have then in mouth cleanliness a most important factor in preventive medicine, and it can be asserted with a degree of positiveness that is fully borne out by experiments and by clinical experience that this disease might be almost eliminated from human ills were it possible to keep the mouth in a clean, healthy condition."

Miller says, "Apart from the many local diseases of the mouth and teeth and their various sequences, the oral cavity serves as the port of entry for bacteria of a long list of the most fatal diseases to which the body is subject," and mentions among these, tuberculosis, pneumonia, cholera, typhus, etc. It has been only a short time since the publication of the work by William Hunter on "Oral Sepsis as a Cause of Septic Gastritis, Toxic Neuritis, and Other Septic Conditions." This shows that the medical profession is waking up to an appreciation of this danger, and with them as friendly, appreciative allies we may reasonably hope that the demand by the public for prophylactic treatment will assume greater and greater proportions.

Third. Oral hygiene and prophylaxis as an operative measure.—The one notable addition to this phase of the subject during the year is that presented by Dr. L. C. Bryan of Basle, Switzerland (DIGEST, January, 1904, p. 79). He advocates the use of nitrate of silver in forty per cent solution, to be applied to all of the surfaces of all the teeth after drying them. The stain is then removed with iodin and all surfaces thoroughly polished. This treatment is repeated every six or twelve months, according to the susceptibility of the patient, whether there are any defects or not. This leaves a deposit of iodid of silver, which is a yellow, insoluble antiseptic powder, in the superficial parts of all fissures and crevices, while the nitrate, which penetrates more deeply, is left in the bottom. We are cautioned against its use about front teeth with porcelain or leaky gold fillings on account of the discolored joint produced. Dr. Bryan finds that the teeth take on a denser appearance after the treatment, and he believes that the nitrate of silver bath stimulates the tooth-building cells to new activity. This Dr. Miller and others doubt. However this may be, Dr. Bryan's report of the clinical results are certainly most encouraging.

Miscellaneous.—Dr. Harlan in a paper on the "Drug Aspect of Lesions of the Gums" calls our attention to the great evil which naturally follows to the teeth and gums from the use of the finely-comminuted, premasticated breakfast and luncheon foods. He says that if we are to keep our teeth in number and form and health they must do their share of the work of the body to justify their place in the organism. When the use of these foods is largely indulged in the gums should be rubbed in some manner to insure perfect circula-

tion and health. Dr. Smith's vigorous rubbing of the teeth with pumice and stick would certainly fill a great need in these cases.

Dr. C. M. Wright calls attention to the mistake of throwing the responsibility of oral prophylaxis upon the patient, with his unskillful use of the brush and his liberal use of mouth washes and dentifrices, and insists on frequent visits to the dentist. The results obtained for their employes by the Diamond Match Co. by frequent and systematic prophylaxis is cited as evidence of its importance.

Dr. M. L. Rhein in two papers on "The Trained Dental Nurse" gives us what seems to be a practical solution of a difficult problem. The importance of prophylaxis is dealt with and reasons are given why this phase of dental practice is ordinarily neglected, among the most important of which is the fact that the dentist with an average practice has his time taken up in repairing the ravages of decay and has little time left for its prevention. The idea of the dental nurse trained specially in a department of the training schools for nurses, and carrying out the prophylaxis treatment under the direction or prescription of the dentist, is certainly worthy of careful consideration. It has been very favorably received, and in many quarters is being put into practice with good results.

Dr. Richard Grady in a paper on oral hygiene for the school boy and girl pleads strongly for the introduction into the textbooks of our school children of suitable instruction on oral hygiene. We believe this to be the proper solution of the question, rather than the introduction of a textbook devoted entirely to oral hygiene, as is advocated by many. Nothing can be permanently gained by emphasizing the importance of a subject out of its true relative position. Oral hygiene is a very important branch of general hygiene, and as such it should have full treatment in the textbooks on physiology and hygiene. We believe with Doctor Grady, that "When we get into the textbook what we want the children taught in oral hygiene half the work will have been accomplished."

DISCUSSION. *Dr. M. L. Rhein,* New York: Dr. Chace has given us an excellent report, and so large a field is covered therein that it is almost impossible to discuss it without going into much detail. Personally I do not entirely agree with some of Dr. Miller's conclusions, and think that in some respects he has been rather dogmatic. This question of immunity and susceptibility is in such an experimental state at the present time that we are not warranted

in finally accepting the conclusions offered, especially as Dr. Miller's views differ from the clinical observations of many men who accept all the scientific experiments that he has performed.

Dr. E. P. Beadles, Danville, Va.: The point was made that tobacco preserves the teeth to a certain extent, but nothing was said as to what form it was in. I would ask Dr. Chace whether he considers tobacco beneficial or injurious.

Dr. Chace: I am unwilling to answer that question definitely, as there is a moral consideration involved, but ordinarily I believe that chewing is beneficial. Miller's investigations referred to the use of tobacco smoke to destroy bacteria, and the investigations referred to by Dr. McCall showed that the use of tobacco increased the sulphocyanid in the saliva, but the effect on caries might be entirely different from its effect on lesions of the gums. We know that smoking increases tartar, and it therefore might have a bad effect on the gums even if it did inhibit caries.

Dr. Beadles: As regards the use of nitrate of silver, the more I employ it the stronger my faith becomes in it. Frequently where I did not wish to extract the third molars I have used a strong solution in the cavity and then filled the latter with gutta-percha, especially where there was no occlusion and in children's teeth. In my own little girl the central incisors, although a little blackened, were preserved until ready to be shed, and I have frequently saved deciduous teeth by the use of this agent.

Dr. J. H. Crossland, Montgomery, Ala.: The organs of the human body that contribute most by their functioning to their own health and that of the whole system are the teeth. In common with other organs they cry out to Nature for use and cannot be healthy without it, and the other organs cannot be healthy without them. The teeth of the tobacco-chewer are generally the best that we meet, all things considered. They may be stained, but decay will progress slower in them than in any other teeth.

Dr. R. H. Jones, Winston, N. C.: Dr. Crossland has overlooked one great evil caused by chewing tobacco. I have practised for several years in a tobacco country, and from careful observation believe any advantages of chewing are greatly overbalanced by the wearing away of the teeth.

A Member: Do you chew?

Dr. Jones: No, sir; and I certainly would not do it to clean my teeth. Tobacco may possibly retard the growth of bacteria and thus prevent decay to a certain extent, but it has many disadvantages and I believe it is a mistake to advise people to use it indiscriminately.

Dr. W. G. Mason, Tampa, Fla.: I come from a region where many smoke and few chew, and it is rare to find a smoker who has not very bad gums, although his teeth may not be injured.

Dr. Rhein: I think Dr. Crossland has overlooked an important point. The constant chewing of tobacco brings about an excessive flow of the various secretions that make up the oral fluid—not the saliva alone, but the entire contents of the mouth. This constant excitement of the salivary glands, which are important attendants upon the act of digestion, is followed by a vitiation of the power of those glands, because no such function can be kept up all day and have a healthy state continue. Clinical experience has demonstrated to me that the habit of chewing gum interferes with digestion if carried on to a considerable extent, and I believe the same is true of the habitual chewing of tobacco. I think that it also tends to hurt the soft tissues around the roots of the teeth just as excessive smoking does, and one will do as much harm to the soft parts as the other. I believe that the moderate use of tobacco is beneficial, but I think that if used to excess in either smoking or chewing it is very harmful.

Dr. B. Holly Smith, Baltimore: This assumption of the harmfulness of tobacco is certainly along the line of oral hygiene, and Dr. Rhein has in a very temperate way approached the subject. I believe that if we did not chew nor smoke we would be better off, but I don't believe any moderate user of this seductive and pleasurable narcotic will admit that it is harmful.

ORAL SEPSIS IN CHILDHOOD, WITH ITS ATTENDANT EVILS.

PAPER BY BESSIE B. BENNETT, D. D. S., BALTIMORE.

In dealing with young patients one is often reminded of the lines:

"Heaven is not reached in a single bound,
We build the ladder by which we rise
From the lowly earth to the vaulted skies,
And mount it round by round."

For surely the ladder by which we mount to our desires for the welfare of children's teeth is slowly and painfully raised, and when youngsters present themselves with mouths that cast sad reflections upon parents who should be better informed, and when suasion brought to bear upon the little ones themselves and expostulations with parents meet with scant success, the rounds seem indeed far apart. However, when at last the seed falls upon good ground, and the half-formed habit of cleanliness becomes second nature with the child, then in truth do we mount from the lowly earth of our forebodings to the vaulted skies of fulfilled desire.

But why in this enlightened age, in which education is the watchword and ignorance a crime, should children be the victims of ignorance, and why should the parents not be compelled to inculcate into the receptive and growing mind of the child the moral necessity of dental cleanliness—for uncleanliness in any form, whether it be in child or adult, influences and lowers the moral atmosphere. After the soft linen cloth has ceased to be used in the child's mouth, what an alarmingly small percentage of mothers sees that the child performs regularly and well the tooth-brush exercise.

Let us follow the calendar of septic conditions of the oral cavity—accumulations of tartar and probably green stain, decay of dentinal

tissues and offensive breath. The pulp of a deciduous tooth being abnormally large in relation to the tooth itself, a comparatively small area of decay causes the little sufferer exquisite pain, and especially is this true during mastication. To save itself this pain the child shifts the food to another part of the mouth until all refuges fail, when the food is bolted, swallowed whole as it were, and the stomach, called upon to do double work, rebels. Digestive disorders occur, and no one knows the cause thereof.

After a while abscesses may appear, and aside from lowering the physical tone of the system, the pus organisms, principal among them being the streptococci and staphylococci—both active, pathogenic bacilli—are taken with the saliva and food into the digestive tract and on through the circulation, in either of which positions they may originate grave trouble. Furthermore, we are told by various authorities that in health the mouth is the abiding place of from 30 to 100 varieties of bacteria, and if this is the case under fairly hygienic conditions, what must there be in the presence of accumulated tartar, pus, decay and stumps of teeth. What a great increase there must be both in number and variety to emigrate from the oral cavity to distant and in many cases more susceptible parts of the human anatomy.

Also the pulp, either from constant exposure or by the medium of a dentist, becomes devitalized, absorption does not progress normally, and the permanent tooth finding an obstacle in its path takes the course of least resistance, and the result is irregularity of the dental arch.

All this train of evils—tartar, decay, entailing severe pain, digestive disorders arising from improper mastication, anemia, rare cases of septic poisoning, irregularity of the permanent teeth—all this unnecessary suffering, are laid upon an innocent child by the neglect or ignorance of parent or guardian.

Do you think that the fault lies at our door, from our negligence in educating the parents in the proper knowledge of dental facts? Do you think if some able member of our profession were to prepare a little pamphlet for distribution among the clientele, setting forth the evils of oral uncleanliness in childhood, and using a generous sprinkling of such bacteriological terms as saccharomyces albicans, staphylococcus pyogenes aureus, bacterium gingivæ

pyogenes, and their fellows, that the adult race might become alarmed for themselves and their offspring and turn over a new leaf?

At college I used often to think that the lecturers were telling fairy tales when they spoke of the neglect and uncleanliness of the mouths of some people. My first practical introduction, however, sufficed to dissipate all doubts. The patient was a tiny anemic little mortal, who looked as if results might have been better if the hard-earned money which had been foolishly expended in decking the small body with cotton ribbons and laces had been invested in wholesome food for both mother and child. When that small person's mouth was opened there appeared a vast sea of tartar and debris with tooth structure but little in evidence. Had not the ocular proof been before me I could not have believed that so small a mouth could contain such accumulations.

Another case was of a mother and six children. Prophylaxis was to them a closed book. Each mouth was worse than the other, and expostulation seemed vain. One day, however, the mother proudly announced, "I have bought a tooth-brush. I paid twenty-five cents for it, and *we all use it!*" Fancy one tooth-brush bearing the strain of seven owners. I reasoned, however, that one tooth-brush would assist somewhat among the seven in maintaining the cleanliness I had caused to come out of chaos, and as the family was already on the roll of the charity organization I feared that seven brushes at twenty-five cents each might mean temporary bankruptcy for the Society.

These college cases represent the children of the poor, but the same conditions are met with in all ranks of life. It becomes rather discouraging when children of cultured parents announce that they have stopped using a tooth-brush "because the bristles come out," or "It's so silly to scrub round in your mouth with a brush—what you eat ought to clean enough," and when parents themselves ask in a sort of sneering way, "What's the use of wasting so much trouble on the child's first teeth, others will come?" reason thinks of deserting.

Compare two children, one a sickly, fretful, anemic, little mortal, with big black-ringed eyes, taking no pleasure in itself or its surroundings, another a bonny little body, rosy-cheeked, laughing-eyed, and hale-fellow to the universe. Six times out of ten the

former has an unclean mouth and decayed teeth, while the latter has his oral cavity in a fairly good condition.

How fine it would be if the parents could be taught, or better still if it could be instilled into the children themselves, that the teeth, including the first ones, are not responsible for themselves alone, but are accessories to the perfectly constructed mechanism which God has given us in our body, and with one part out of working order the beautiful whole is weakened. The perfect working together of the members of the human body is emblematic of the fellowship of the universe—in Emerson's words:

> "Nor knowest thou what argument
> Thy life to thy neighbor's creed has lent,
> All are needed by each one,
> Nothing is fair or good alone."

How can we teach the parents and children that "Nothing is fair or good alone"? Would it not be time well spent if more of the states would follow the lead of some of our Southern members of the Union, and through the medium of the public schools, suitable lectures and text-books teach the children themselves the incomparable value of their teeth?

As this paper is supposed to tend towards the melioration of the neglect of children's teeth, I should like also to put in a plea for more sympathy for the little tots. A child is like a rare exotic—tenderly cared for and nurtured each will open and reveal to us the golden heart within, but under harsh conditions—in an unsympathetic atmosphere, in unkindly hands—it will droop and shrink within itself. Nowhere is this characteristic more apparent with children than in the dental chair. The writer's aversion to personal dental operations is due to the fact that up to the age of sixteen she was under the care of two dentists, who would each calmly go ahead and do what he had to do, without an atom of thought for the poor little shrinking being in the chair. Don't think that they were unlettered or brutal, for they were neither, both being cultured, educated men, of high standing in their profession, and both having rendered valuable services to their associates and successors, one in an educational, the other in an experimental line. The whole trouble was that they both failed to realize that the child lacks the mature reasoning power of the adult.

In my opinion children under a certain age consider every pain inflicted upon them as sheer cruelty on the part of the operator. If the little one is capable of understanding why he is hurt, by all means take him into your confidence, and once you have gained his trust the Rubicon is passed. Tact has more power than coercion, and the latter often brings to the front that element of stubbornness of which even the most cherubic infants have an unlimited supply.

It seems strange to me that there are no dentists who make the treatment of children a specialty, just as some physicians make a specialty of children's diseases. Picture books to look at while awaiting their turn put the mind in a more charitable condition, and a story of the dear old "once upon a time" will prevent many a little mouth from being drawn over your fingers like a tight rubber band. Anything to divert the child's mind. One little patient, who is of a very nervous temperament, acted so beautifully one day after I had explained the mechanism of the dental engine, cable and bur, that I immediately resolved at the first opportunity to read up on mechanics for the benefit of nervous little boys.

Above all, don't let a parent persuade you to do too much at a sitting in order "to have it over and done with." Let them come often. You won't lose by it. One little tot, now in my care, had like myself as a child been in the hands of a well-meaning but over-zealous worker, and became my staunch champion because I refused one day when her guardian insisted that five temporary teeth, tight in their sockets, while the successors were also presenting, should all come out at one sitting, although after the third (when I stopped for that day) the little arms and limbs were twitching spasmodically, and the little Spartan was shedding never a tear. The guardian and I had a war of words, but the other teeth did not come out that day. The little girl thinks me not exactly a dentist, but a sort of hybrid, not knowing that my sympathy for her springs from that stern teacher, Experience.

Some of my hearers may be wondering how I can practice dentistry for children without hurting them. I don't, but if the operation will be painful I tell the child so, and let the little martyr see that I am sympathetic. Sympathy costs nothing, but smooths many a weary way.

When we come to the spoiled and pampered youngsters, who

howl and kick, each probably has his own individual methods for dealing with them. In cases like this Solomon had my sincere approbation when he said, "Spare the rod and spoil the child." It is my hope, however, that not many of the aforesaid youngsters try to bite off the operator's fingers, as once happened with me.

Finally, in even so little a thing as the filling of a child's tooth the following beautiful lines may apply—"I expect to pass through this world but once. Anything therefore that I can do for my fellow-man, let me do it now; let me not neglect nor defer it, for I shall not pass this way again."

DISCUSSION. *Dr. M. L. Rhein,* New York: I am sure that I echo the sentiment of every one present in complimenting Dr. Bennett for the clinical pictures she has drawn so well for us of the tribulations of children in the dental office. I thoroughly agree with her, that if we are to be the saviors of the teeth of mankind we must begin with the very first one that is erupted, for it is at this time that the impression of prophylaxis must be marked sharply and strongly, and the essayist has struck the proper note along this line. She says it is necessary to reach the sympathetic chord of the little ones to gain their confidence. To work for very young children is a pleasure rather than a trial, and becomes difficult only when they have been frightened by the awful tales of dental work related to them by their brothers and sisters or nurses, and unfortunately even by their parents. The properly trained child is not difficult to handle, as he knows nothing of the pain and discomfort that are unfortunately allied with the practice of dentistry in later life, and we would have absolutely no difficulty with little children if we inculcated into their minds the value of dental prophylaxis. The lesson is much more easily learned at that age than at a later period in life, and if properly taught it is never forgotten.

Dr. W. G. Mason, Tampa, Fla.: This matter of a pamphlet to be furnished to parents, so that they may know how to care for their children's teeth, is an important matter and should be looked into carefully. I think it would be well for the Association to appoint a committee to draw up such a document.

A FEW GENTLE HINTS.

PAPER BY L. C. TAYLOR, D. D. S., HARTFORD, CONN.

In the winter of 1876 Dr. John M. Riggs came to this grand and beautiful city. While here he visited the Museum of Ancient History, and among other things examined the skulls of 164 prehistoric Indians. These wonderful creatures, who existed many centuries ago, had physiques and personal endurance that we might be proud to inherit. While the intellectual faculties were not over-developed, we believe it is interesting to note what was found. Of the 164 skulls examined there were but two with teeth decayed, and only two that showed signs of inflammation of the gums sufficient to produce absorption of the alveolar border. All indications pointed to health, longevity of life, and the teeth of a large number of them showed signs of vigorous use, as they were considerably worn.

Now let us contrast this with what we find in the mouths of our common and so-called well-to-do people. What per cent of them can produce a respectable, cleanly, wholesome mouth? Let my friends answer. To me it is a serious thing to see young people, sixteen to thirty years of age, under the doctor's care for what they call dyspepsia, and in some extreme instances they are reported to be on the verge of general decline or nervous prostration. Can you tell me why so many men will read papers and discuss at such length the importance of boiling their instruments fifteen or twenty minutes for sterilization, and then observe the septic condition of their patients' mouths only so far as to fill a cavity when easy of access? There seems to be a general desire on the part of all dentists to be known as Doctors of Dental Surgery. When that degree has been obtained they immediately turn their

attention to filling teeth, making bridges, and such mechanical operations as can be seen in the mouth, with perhaps an occasional treatment of a septic tooth.

Why are so many men willing to treat a septic tooth? Because there is going to be a premium paid, and that premium is a chance to make a filling. Are these fillings good savers of teeth? Will you state what per cent of gold fillings is valuable? Of all teeth filled with gold, when no other preservative of tooth structure is used, there is not ten per cent well preserved for five years. Of course this statement is not based on any one man's experience, for many men have so much pride in their work that the percentage is very much higher. Our Western friends are becoming so zealous in saving teeth with gold that they cut away a very large portion of enamel and cover the dentin with gold. This they call extension for prevention. I believe that if those friends would conserve the good looks of those teeth by proper and conservative preparation of their cavities, and then pay a little more attention to hygiene and prophylaxis, their service would be much more appreciated by their patients. Where is the person, well educated and refined in his general nature, who wants to see gold built out on his teeth, either in fillings, caps or bridges? When this unsightly display of gold has been made, will you say how many men are recalling their patients, monthly, bi-monthly or even tri-monthly, to thoroughly clean and polish that jewelry and the teeth that are carrying the same? How many are recalling their patients to remove all foreign substances from the mouth, thereby preventing the common diseases which follow? How can we expect the dental profession to attain the high rank of hygienists when our professors in colleges will swish a little iodin across the six front teeth? A half minute with engine and brush, when the patient is dismissed, carrying all the germs of disease so prevalent in the mouth, to lay that patient on the altar of general prostration.

It has been a great source of satisfaction to me to see the general interest that is being taken by our Southern brethren in the advancement of the cause of prophylaxis. It would be a still greater satisfaction could I see the same interest following the sun in its westward course. It was my privilege to be associated with Dr. Riggs and listen to his teachings thirty years ago, when the unwholesome condition of the mouth was called "scurvy of the gums,"

There was then, as now, a great deal of opposition to advancing along any line of usefulness except it be of a mechanical nature.

Since Dr. D. D. Smith commenced his teachings of prophylaxis, showing such results as have never been before attained, my enthusiasm has gotten much the better of me, and for five years I have had the honor of presenting a prize to the students of the New York Dental School for the best practical results in oral prophylaxis. Barnes Dental College of St. Louis has honored this department by having a special professorship, thereby making it a recognized department of the dental profession. Some of the Southern colleges have introduced some lectures along this line, but I have not learned of a dental board that has taken any interest in the matter.

Bacteriologists have shown us pictures of their pets for many years, until we know the bacteria almost as well as we do the multiplication table. They discuss at great length the difference between alkaline and acid secretions, determined by the best of chemical tests; they photograph and give us the name of each and every one of these little germs; but what does it matter whether we call them Japs or Russians if we fail to call them out of the mouth? Where is the man among the bacteriologists who has given us any well-defined, businesslike system of how to rid our patients of this nefarious evil? This photographing bacteria and showing same on the screen is all right to teach in colleges to the freshmen and sophomore classes, but when we come to the juniors and seniors it is time to take a step forward into prophylaxis and show these young men and women how to rid their patients of the evil consequences of such bacteria.

There is another phase confronting us to-day. Many believe the profession is overcrowded. With such as it is I think it may be true, but when our dental boards have attained to a standard equal to what may be attained in oral hygiene and prophylaxis, and decline to pass a man who is not fairly well versed in such training, we will have such a revolution in the demand for work that there will not be half enough men to supply that demand. There is more valuable service left untouched than is done, and so much of that rendered is worthless to the patient that it is a wonder to me people have as much confidence in us as they do.

Not long since a prominent man asked me if I believed dentistry

was maintaining as high rank to-day as twenty-five years ago, and I was so surprised that I did not attempt to answer his question. He further remarked that while there were good men in the profession it seemed to him the average man was not up to the standard of twenty-five years ago. Why are people judging us in this light? Is it because we deserve it? Has not all our advanced education, reinforced by the dignity of examining boards in every state, counted to our credit?

The public demand as far as they are educated, but the education for years past seems to have been running mad along the downward course of mechanics—cutting away two good teeth for the purpose of bridging one—and it seems a fitting time to sound the alarm in tones loud and long, for if this mad course continues the last state of our patients will be even worse than when Josiah Bacon made such exorbitant demands for royalty in permitting us to make a rubber plate. The extraction of bad and good teeth to make room for a plate made a cleanly mouth possible, but the insertion of many bridges produces a condition which makes it impossible for the patient to keep the mouth wholesome. It is time for the dentist to rid his mind of the idea that it is a disgrace to remove foreign substances from the teeth. We must educate our eye to the healthy and cleanly and be prepared to render such service as may be necessary to procure these results. Do not complain of your patients not caring for their teeth. It has been my experience, as I recall my patients and show an interest in their health by giving them a cleanly mouth, to before long hear them ask: "Doctor, what can I do to help keep them clean between times?"

Pyorrhea, sometimes known as "Riggs' Disease," is very prevalent in civilized life. It is a pitiable sight to see so many of our eminent men wandering in the wilds of Africa, trying to convince us that uremia is the cause of this loathsome disease. Can you show me an individual among them who has brought back one single idea that is self-proven or given a practical demonstration of cure outside of his imagination? The contrary is proven in every instance by the fact that when the disease has extended so far that it is impossible to save the teeth for usefulness only extraction will effect a cure. This trouble is overlooked by many who do not seem to know of its existence until the teeth become so loosened and the bone wasted to such an extent that in many

cases even the expert is not able to save them. This is all wrong. The first symptoms of inflammation in the gums should be recognized, and the cause removed before the slightest particle of pus is present. If we recall our patients monthly, bi-monthly or tri-monthly, and educate our own eye to the healthy and cleanly, we will never have pyorrhea and the consequent loosening of the teeth. Recession of the gums, with a thickened, whipcord edge, may be reduced by proper removal of any irritant. Some call it a vitreous coating, but whatever it is, remove it.

I have referred to the engine and brush wheel, and they have their place in dental service, but that place is not in the performance of such prophylaxis as we desire. When you polish the face of the tooth with the brush wheel it will do its work so well on the face of the tooth above the gum that when we attempt to do the rest we find we have lost our guide and are deceived in doing that which is of the greater importance. I have never seen nor known of good results along this line except by the greatest care and all hand work. If the patient is sensitive to being hurt, sprinkle a little cocain salts over the gum and allow the saliva to dissolve the crystals, when you can do some vigorous service without serious complaint. The cocain should be used about the same as when applying it to adjust the rubber dam, but in no case allow the patient to swallow it. It can be used liberally in this way without danger if not swallowed. I have been cautioned by young men of the danger in using this drug, but many years' experience without the slightest symptoms of trouble has proven that it can be used judiciously in almost any case, and especially when treating gum irritations. When the mouth has been brought under perfect control there will be little if any need for the use of cocain.

All methods are proven by the results obtained, and I contend that prophylaxis is proven beyond a doubt or question. Let us not complain of the profession as being overcrowded, for in this case the fault is with ourselves. The public are anxious and willing to be taught better methods, and with us lies the responsibility of teaching them. Prophylaxis is the only true and practical method which has solved the problem of painless dentistry.

LIMITATIONS OF DENTAL PROPHYLAXIS.

PAPER BY M. L. RHEIN, D. D. S., NEW YORK.

The value of keeping the oral cavity in as nearly a hygienic condition as possible is no new doctrine, and its benefits have been described by the earliest writers on dental topics. The essence of dental prophylaxis can be summed up in one word—cleanliness. Establish and maintain this condition, and diseases of the teeth and their contiguous parts become, as far as we know, an absolute impossibility. This sounds like an easy proposition, but only the careful observer realizes the small percentage of mouths in which anything approaching such a condition can be maintained. This, however, is no excuse for the dental practitioner's failure to teach and impress its value on every patient who seeks his services.

During the past quarter of a century preventive dentistry has been taught in a larger degree than ever before. The steady and increasing propaganda of different teachers, mostly in the United States, is finally showing its effect, and there is at the present time a gleam of hope that the practice of the principles of dental prophylaxis will soon find a permanent and systematic status in every reputable practice. At present there is some discussion as to how this question should be met. The principles, however, remain the same—preserve as far as possible a clean condition of the oral cavity, and in doing so bring about a normal condition of the capillary network which otherwise cannot properly perform its function as a carrier of nutrient activity to the dental territory.

In a number of papers presented on this topic I have endeavored to show how futile it is for a busy practitioner to personally attend to the duty of tooth polishing and counteracting the inroads of bacterial agencies. The trained medical nurse prepares the patient for the surgeon by placing the parts to be operated on in a sterile condition. In like manner the trained dental nurse should clean, polish and sterilize the dental organs before the dentist commences

any work. The gratifying reports received from all sections of the country during the past few months indicate that the plan of training women as dental nurses for the carrying out of this object is meeting with great favor by the busy practitioner.

The present drawback to its adoption is the lack of educational institutions for this purpose. On that account the dentist up to now has been compelled to train and teach his own nurses. There is no question but that those who have followed this plan have found it to be not only beneficial to their patients, but profitable to themselves.

There is no gainsaying the fact that young practitioners, by virtue not only of the time at their disposal, but in furtherance of their manual dexterity, can with benefit to themselves dispense with the services of a nurse and personally do this work during the early part of their career.

No one can fail to be astonished if he will try to estimate the number of well-accredited dentists who will commence filling the teeth of a new patient and never think of first cleaning and polishing them. This initial cleansing and polishing looms up as the primary point of importance, and it might serve a useful purpose if representative societies would in a formal manner declare their position in this matter. I say without hesitation that, except for the alleviation of pain or some temporary work of emergency, it ought to be considered absolute malpractice to proceed with dental operations unless this initial cleansing and polishing has first been efficiently performed.

This brings up another point—the varying methods pursued by different men who claim to cleanse the teeth of their patients. We all know the man who will spend a half hour polishing up the surfaces of the teeth which show. From this class we can proceed by stages to the men who remove all the accretions and polish the surfaces of all the teeth above the gingivæ. We realize well the limited number who give the necessary time to removing every particle of foreign matter not only from the teeth but from the roots, and who never find their operation completed until every exposed surface of tooth structure has been thoroughly polished. This deception towards patients, in pretending to clean their teeth, is often more reprehensible than the practice of those who make no pretense whatever at doing any work of this character,

It is not intended in this short paper to go into the detail of the technique of this work, but it is important that attention should be drawn to the fact that the patient should be informed after the operation has been completed that it will be necessary for him to present himself for such treatment at stated periods. These periods cannot be left to the whim of the patient, nor can they by any means be the same in all cases. It is safe to say that they will vary in different patients from a period of two weeks to three months.

Before dismissing the patient after the primary operation it becomes the duty of the dentist or the nurse to take sufficient time to carefully instruct him in the daily hygienic care of his mouth. This is by no means an easy matter, and frequently fifteen to thirty minutes can be profitably spent if it is intended that he shall fully understand the principles that are taught. It is an absolute impossibility to expect that the mouth will be maintained in a normal state unless the earnest cooperation of the patient is obtained in this regard.

Primarily patients should be instructed as to the character of the brush and dentifrice which is prescribed for them, and then they should be taught to appreciate the importance of using the same, by placing the flattened side of the bristles on the gums as near the ends of the roots as possible and rotating the brush towards the occlusal portions of the teeth. It should be made patent to them that this must be done as a deliberate motion, so that the gums will not fail to receive the beneficial effect of the massage action of the brush. They should be taught the importance of doing this thoroughly after every meal and especially before retiring, and that it is almost impossible to accomplish the desired result in less than four minutes. It is remarkable how difficult it is for some people to learn the proper method of brushing the gums and teeth, and they can frequently be materially aided by instructing them to do the work in front of a mirror, so they may see for themselves that it is properly performed.

The selection of a dentifrice is a matter of greater importance than has been commonly given thereto. It is the duty of the dentist to know what materials are used by his patients in the cleansing of the teeth. We have no more right to leave this to the fancy of the patient, or to recommend something that we are unacquainted with, than we would have to prescribe internal treatment in the

same manner. It is unnecessary for me to say that various forms of dentifrices can be used to advantage in different cases.

Of course it is wise to let the patient understand that after the primary operation of cleansing and polishing has once been properly done the succeeding operations will become very simple in comparison. It is also best when he returns for succeeding treatment to have the nurse catechise him as to the manner in which the directions previously given have been carried out. Too frequently it will be discovered that they have been entirely misunderstood, and a fresh course of instruction is then necessary.

With all the care that the dentist or his nurse can give, aided by the heartiest cooperation on the part of the patient, there are certain conditions of life when it becomes impossible to keep the oral cavity in a physiological state. The extreme views that have been held on this subject—that it is possible to so care for the teeth in a prophylactic manner that other forms of dental work will be absolutely unnecessary—have brought no slight amount of discredit on the entire doctrine of preventive dentistry, and I might say that they have even served as an excuse for many to retain their unscientific methods of caring for the teeth. That the general principle holds true of the teeth of people in a state of health is not denied, but it would not be difficult to count the number of our patients who go through life always in a state of such health that all the organs are performing their functions in a truly physiological manner. In the degree that we meet with variations from the normal type in the same degree will we find limitations to the benefits to be derived from the most energetic form of dental prophylaxis that can be practised.

It is well that these limitations should be clearly defined and understood, so that the practitioner will deceive neither himself nor his patient. In acute diseases of all forms affecting children or adults, where the patient is confined to bed for a period of time, it is impossible to obtain the benefits of manipulative prophylactic work. In many acute diseases anything approaching manipulative work would be only irritative in its results, and consequently prove harmful instead of beneficial. In some of the diseases of later life a certain amount of manipulative work is frequently beneficial, while if injudiciously carried to the stage called for in ordinary cases it will produce destructive results.

There are certain periods of life where, on account of functional disturbances of one kind or another, we find the oral secretions in an abnormal state. This may be of a temporary character or cover a longer period of time. All the combined prophylactic work of the dentist and patient will not avail against serious perversions of the excretory glands which combine to form the oral secretions. It is not denied that manipulative prophylaxis is of value in these cases, but it is a physical impossibility to do the work frequently enough to prevent the painful injuries resulting on one hand in erosion of enamel and its attending evils in hyperacidity, and on the other hand resulting in caries more or less rapid and necrotic gingivitis from hypoacidity.

These strongly alkaline conditions of the oral secretions are the most difficult to combat and the most destructive in their results. These are the media in which the racemoza bacteria thrive best, and in which as a result caries is most destructive. Perhaps this can be more readily understood by picturing the well-known cases of growing children, where all the hygienic care that is possible is impotent against the destructive action of caries. This is caused by the inability of this class of children to properly meet the increased demand for nutrient matter. Their growth and development seem to proceed at the expense of the entire body. One of the results is seen in this perversion of the oral secretions, due to chemical changes. This alkaline fluid presents the media in which nothing seems to avail against the rapid progress of caries. When the child reaches a certain age, and the developmental period seems to be attained, in a flash the secretions of the mouth change, and we realize that the child has reached the period of immunity from caries.

In this manner we could proceed almost ad infinitum and show how futile is our effort when directed against certain pathogenic conditions. These conclusions, however, should not deter us in the great and humane work of spreading over the entire world the benefits to be derived from preventive dentistry, but in so doing let us retain our proper professional and judicial status. Let us look at it from a scientific standpoint and be conservative in our expectations. Is it professional to hold out promises of perpetual immunity to our patients? We must realize that with the best of intentions on our part the conditions pertaining to a healthy mouth can be maintained only to a limited degree at certain periods.

DISCUSSION ON PAPERS OF DRS. TAYLOR AND RHEIN.

DISCUSSION. *Dr. L. C. Taylor:* I wish to make one further remark while speaking of prophylaxis and oral hygiene, as there seems to be a great difference of opinion as to what they mean. Hygiene is defined as that branch of medical science which pertains to the preservation of health. We are supposed to have health first, and then to maintain it. Prophylaxis is not defined by all dictionary authorities, as it is a rather new word and is probably used more in dentistry than in any other profession. Most dictionaries define it as "a preventive treatment." It seems to me that it is used and comprehended at the present time by those who are taking the greatest interest in it, especially by Dr. Smith, who has brought it so much into the foreground, as meaning surgical or manipulative treatment for the preservation of health, and I believe that is a better definition. There are many people who consider prophylaxis to mean simply cleaning of the teeth, which is correct, but that is only a limited field and is as nothing compared to what is meant by those who teach it most.

Dr. M. L. Rhein: In my opinion it is an absolute waste of time to stop to differentiate between these two terms, as they mean precisely the same thing. Without seeking any laurels, so far as I am aware I introduced the word prophylaxis to the English-speaking world. This was in 1882, when I was in search of a word that would protect the manufacturers of the tooth brush known by that name.

Dr. J. N. Crouse, Chicago: I never saw mouths in such good condition as those Dr. Smith showed me in his office, but I have not been able to induce my patients to keep their mouths in such excellent shape. However, I attribute Dr. Smith's success to something more than his monthly treatment. He is vigorous and sarcastic in speech, and I believe his success lies not so much in getting his patients to come to his office every thirty days as that he impresses them with the importance of their so doing, and they would hardly dare come to him a second time unless they had been carefully and thoroughly brushing their teeth. Be this as it may, it is surely a good thing to see one's patients often, as it must increase diligence on their part.

A Member: Do you believe that if we talked to our patients as he does to his they would come back to us?

Dr. Crouse: No, I believe it would have a tendency to drive them away. I don't think the average woman can do this work properly, because it requires a great deal of skill and thoroughness, and I don't believe enough girls can ever be trained to do it. Dr. Rhein's suggestion about dentifrices is timely, and the dentist must not only designate what one his patients shall use, but must examine and test the best ones before making his decision.

Dr. B. Holly Smith, Baltimore: Since I visited Dr. Smith's office and examined some forty mouths which had been treated by him I have felt a new responsibility to my patients, and I have worked as never before. I had not been careless previously, but the success which I have attained along this line has been a revelation to me. When any dentist will absolutely clean and remove every particle of calcareous matter from the tooth, polishing it as it should be polished, he will leave it as nature intended it should be. No diamond ever shone more beautifully than a new tooth, and no surface was ever more pleasingly polished. Look in the mouth of a dog, and then think what it would mean if we could make the teeth of our patients stand forth in their proper gingival relation with the delightfully healthy expression we see in the mouths of animals.

Dr. N. N. Vann, Gadsden, Ala.: When I was in college I was impressed with the fact that the majority of students did not want to clean teeth, and when the juniors and seniors worked for a patient they would always turn the cleaning over to the freshmen. I believe this was due to the fact that they did not appreciate the real value of the thorough performance of this operation. I did not then nor for a number of years afterward, and I believe the majority of us left school in this state of ignorance. Even now it is impossible for me to clean teeth as I should like to, for I find it extremely difficult to remove every particle of salivary calculus. We would have less inflammation and so-called pyorrhea if we paid proper attention to cleanliness. I have often wished for something that would impress my patients with the importance of keeping their teeth clean, and have endeavored to secure a chart showing the injury salivary calculus does, so that it could be hung on the wall and impress the patients as do those charts showing dentition and other

subjects. Dentists, in the country at least, are largely to blame for the negligence of their patients in this matter. It is the custom in many country districts to "run over" the teeth with a brush after having done other work, and not charge anything for the cleaning. I believe we should do as Dr. Rhein suggested—clean the teeth first and then impress the patient with the necessity of keeping them clean, and we should charge for the cleaning just as we would for putting on a crown, for no part of our work is more important than this.

Dr. Robin Adair, Atlanta, Ga.: I had hoped that it would be accepted as merely an academic proposition that prophylaxis was essential for the preservation of the teeth, but there seems to be a difference of opinion among our eminent men as to whether even dentifrices should be used. One offers the experiment of putting a tooth in a vise and wearing away the enamel in a few hours with chalk and brush, while still another says that the tooth brush should not be used, but simple massage of the gums. If these men, learned in their profession, will not put forward every effort to advance prophylaxis, what can we expect from people who understand little if anything about it? I examined a dentist's mouth a few hours ago, and he apologized for its condition and said his tooth brush was at home. It is probably a fact that many of the dentists here have not brushed their teeth to-day. How can we expect to inculcate the proper principles and habits into the minds of our patients if we do not appreciate and practice them ourselves? It is a fact that dentists will not spend the time necessary to obtain prophylaxis of the mouth because it takes an hour or two to cleanse every surface of the teeth, and they can afford to spend only a few minutes with a little rubber wheel and then dismiss the case as clean. We should call this cleaning by some big name and so make the patients appreciate its importance. I often take their hands in mine and go through the motions in their mouths so as to teach them. The dentist should not merely talk, but should make the patients demonstrate while in the chair how well they can brush their teeth. Sometimes I illustrate with a brush on a set of false teeth. When a proper brush is used, and the patient knows how to handle it, the teeth will not be injured by any good dentifrice. In cases where we have operated for Riggs' disease and there is exposed dentin which is rough and

which readily collects deposits, it is imperative that a liberal supply of dentifrice be used to keep those surfaces polished.

Dr. Beaty, Washington, D. C.: One point predominates throughout Dr. Rhein's paper—cleanliness, which is highly essential—but many of us cannot give the time and attention required for absolute cleanliness of the teeth, so it would be well if we could teach this work to a young woman in our offices and then charge our patients a small sum for the services which she renders.

Dr. B. H. Teague, Aiken, S. C.: I think dentists in the South are very lax in prophylactic work, owing to the fact that they do not get paid for same. They are surrounded by so many cheap Johns that they do not have the grit to charge a sufficient fee for that kind of work in the first years of their practice. I recently did some work for a wealthy but stingy man who lives twenty miles away. His gums were bleeding from calcareous deposits, and I charged him five dollars an hour for two hours' work of cleansing. He paid the bill willingly, and when the report of my collecting from him such a fee for cleaning the teeth spread abroad the dentists in his town were able to charge a little more for this kind of work than they formerly did. I have a woman who assists me in the office, and I charge so much an hour for this class of work.

Dr. Taylor: With regard to what Dr. Rhein said about prophylaxis being a waste of time, I would say that he seems to beg the question considerably. The five leading dictionaries speak of prophylactic and confine it solely to medicine and therapeutics, but the word prophylaxis is a noun every time. Dr. Rhein uses both words as meaning to cleanse the teeth, but what does he mean by that? He does not in any part of his paper allude to any condition where there is a serious affection about the teeth irritating the gum tissue. He cannot cleanse them then; he must remove the matter from the teeth before the gum will come down healthy and firm. If the trouble has gone so far that the alveolar border is honeycombed and necrosed, how is he going to clean it by scraping the teeth? So far as I know nothing short of a surgical operation has ever cured that kind of a case. They talk about curing it systemically, treating the patient systemically for uremic trouble. In many instances of uremic disorders mouth infection is the cause. It is an impossibility to cure a bad case of pyorrhea by systemic

treatment; it must be done strictly from the surgical or manipulative point of view. A surgeon would not be justified in trying to cure a broken leg with a little medicine, therapeutic or prophylactic. Cleansing is a very soft word and does not mean much of anything in this connection, but prophylaxis means something more than cleansing. It means the deeper surgical effects that produce health.

Dr. Rhein speaks of his dental nurse being educated up to a point of competency, but when she reaches that point she will be able to diagnose the causes of the malady, to teach the patient what the disease means and what the treatment should be, and why it is important that the patient should come from time to time to have his mouth kept in perfect order. When the dental nurse reaches that point she will become the doctor and the dentist will be merely the dental jeweler or the dental carpenter.

Dr. Rhein: The one vital point which I brought up seems to have been overlooked in the discussion, namely, that it should be considered malpractice to proceed with an ordinary dental operation in an unclean mouth. There is little difference of belief between Dr. Taylor and myself, and what little exists is due to the fact that Dr. Taylor does not understand me. We have no differences of opinion as regards the surgical treatment of these diseases. I never spoke of having a dental nurse attend to these matters, but Dr. Taylor knows as well as I do that when he has looked after the surgical conditions of the mouth it should then be attended solely by the nurse—if there is one. I deplore the fact that there are no opportunities at the present time to properly train dental nurses, for I could give a great many of them positions with various leading men who have written me. With no desire to advertise myself or to enhance the value of the work to my patients, I would say that my office is open at all hours to any practitioner, and if he can learn anything there he is perfectly welcome to do so. I believe I can show just as healthy mouths from the hands of my dental nurse as these gentlemen have seen from the hands of Dr. Smith.

I approve the policy of telling the patient, "Unless you follow my directions you are no longer a patient of mine," and I have said it many times, but unfortunately those patients come back and it is hard to tell a patient who insists on your services that you will not work for him—you must make allowances for his weakness. I will admit that all of my patients do not present with their mouths in

such a condition as I should like, but I cannot keep some of them from coming back because I have told them not to return unless they have followed my instructions. That is the difference between Dr. Smith and myself—he has personally done this work for his patients, whereas I have not done any of the hard polishing and cleansing, which, when you come right down to facts, covers it all. It means simply the careful cleansing of every exposed portion of the tooth and the polishing of the surface so that it will be as clean as the pure enamel. I do not say that an ignorant woman should be put at this work, and I have spent a long time before I could get women to do it properly. I have taken women who have graduated from dental colleges, even from those schools where Dr. Taylor had offered a prize, and found that they knew nothing whatever about this work. I have also tried men graduates of dental schools, and I find that the women are much better fitted by nature to do this work. One member spoke of working four and a half hours on a case, but we have spent twenty to thirty hours on a single mouth. Indomitable patience is required, but no time is too long or pains too great if the result is accomplished, for once having attained it the patient will do the rest if you are persistent enough.

I do not wish to say anything in depreciation of this work as taught by Dr. Smith, and I strongly advocate that every practitioner should do it in that way, but if there comes a period when a man finds it impossible to do justice to all his patients for lack of time he has no right to neglect a number of them, especially not to sacrifice the poor clients for the rich ones. If a practice is limited to fifty or sixty patients a man can do all the work himself, but I am speaking for those who work for a larger number. I do all the surgical work that is needed in the mouth, but I won't do, even for my wealthiest patients, any polishing or cleansing so long as I have a woman in my office who has been trained to do this work. As regards Dr. Taylor's fear that the nurse will supersede the dentist, the nurse does not do this work on her own account. My nurse does not see my patients independently. I meet the patients when they arrive, tell the nurse what to do, and examine their mouths before they leave her chair. I think my patients get better work in this way than they would if I tried to do everything myself.

The question of fees is important, as the work is deserving of the highest fee that can be obtained for it, but there is no necessity of

going to extremes, for by putting the fee too high you limit the service to the wealthy few. The charge should be based on the amount of time consumed. I place the fee of my dental nurse lower than my own, not that I think the services she performs are less valuable, but because I do not want any of my patients to have the conventional excuse in regard to it.

The point I am now trying to emphasize is that there may be an opportunity to train women for this work. They should of course understand physiology and anatomy, but they need not be dental college graduates nor understand all branches of dentistry. There is a field for all this education, but the field of prophylaxis so eloquently described by Dr. Taylor will never be reached by the public so long as the dentist is bound to do all the work himself. I object to my friends being made the tools of any one man's ambition to further his interests in the minds of his patients. I am seeking for the good of the public, not only of the wealthy, but of the residents of every little humble village. By my plan every dentist of average ability could in the course of a year teach a competent young woman to clean and polish teeth with the orange-wood stick, pumice stone and strips, and she would not only earn a better livelihood than by almost anything else she could take up, but she would be doing a great work for the preservation of the teeth of the nation.

COMMON MISTAKES MADE IN ARTICULATING FULL DENTURES.

PAPER BY E. M. KETTIG, D.D.S., LOUISVILLE, KY.

As I am down for a paper in prosthetic dentistry, I will endeavor to respond and take for my theme common mistakes made in articulating full dentures, or probably a little more fittingly expressed, mistakes or errors commonly made in articulation. It is not my purpose to offer anything that is new in articulation, and those older men in the profession who are ripe in experience and practice will receive but little enlightenment on this subject, as the most of them probably know far better how to steer clear of troubles and mistakes of all classes of work than myself. To the young man, however, who has not yet lived up to a full appreciation of what it means to correct costly errors in his prosthetic work, and who has not yet come in contact with the multitude of mistakes that are liable to happen, it is my intention to speak. If I can point out a few ways of avoiding common errors the purpose of this paper will have been gained. It may be a trite theme, written on by numerous and clever mechanicians and lectured on before college classes, yet the making of an articulated denture, carrying mastication with exactitude and nicety to ideal performance, is seldom achieved by a majority of those who have to do this class of work. The fact is that edentulous mouths which require artificial dentures are so unlike and varied in shape and character as to demand of the operator close study into the laws of physical force that he may better apprehend the safe methods in constructing the work in hand. The edentulous mouth, into which teeth are to be inserted, should receive close study of its muscles, its repose, its play and its varied occlusion, either in over-bite or under-bite, or there will be more mistakes than Moses ever made. Take a case of mandibular protrusion and undertake to fix a denture and you have a worse prob-

lem to solve than the race question down south. Then those maxillæ with obliterated alveoli are equally grievous of mechanical construction. One who can take into his mental grasp all these conditions and evolve by his handicraft no errors is blessed above ordinary mortals in his vocation. A full denture, embodying all the requirements of the mouth, with accurate adjustment of teeth in length, comeliness and occlusion, and satisfactory alike to the operator and patient, so that the critical eye cannot detect the artisan from the artist, and wherein taste and skill have been so united as to lay claim to a masterpiece of mechanism, is an achievement of which to be proud. My purpose is, in the points I offer, to aid those who have experienced difficulties in articulation and make some few suggestions which have valuably assisted me in daily practice.

In partial sets, or in full upper or lower dentures, where there are teeth, however few there may be, we have something of a guide in articulation; but in edentulous arches, where perhaps the teeth have long been lost, our only recourse lies in comparison and study of all the characteristics as when the natural teeth were in the mouth. After this consideration has been given to edentulous arches, and we have decided on their natural positions, built our models, placed these on an anatomical articulator with teeth set up in what we think seeming accuracy of occlusion, we find upon trial in the mouth that though the plates fit well, the antagonizing is in error, and rather difficult correction has to be made or a useless appliance will result. An important point to be carefully noted, but too often neglected, is the selection of teeth with regard to the relative size of the six anterior teeth above and below. The six anterior teeth below should cover a space in width equal to the space between the cusps of the upper cuspids, leaving the distal half of each upper cuspid to cover a portion of each lower first bicuspid. A close observance of this rule obviates the necessity of much grinding to allow the teeth posterior to this point above and below to pass properly to their respective positions. In mounting teeth on the models, where normal occlusion is assured, the common practice is to allow the incisal edges of the lowers to lock just inside the lingual surfaces of the upper teeth, instead of leaving a space of from one to two lines between these two points to allow for lateral play during the incisive function. In abnormal occlusion, of either over or under bite to any marked extent, no set rule can

be adhered to, every case being a law unto itself, but where the bite is normal certain laws should control the articulation of the teeth in order to obtain the most useful appliances as well as those of most natural appearance. We should remember that while the up and down motion, or the hingelike movement, is an important one, we want not only the crushing force of the jaws, but also that there are other motions of vital importance. One is the protruding motion during the act of biting, and provision should be made for that function by placing the upper teeth far enough beyond the lowers so that when this function of biting takes place the incisal edges of both jaws will meet, before allowing the lowers to slip back to their allotted places. There should be not only an overbite of one line or more, but an over-lap also of the same amount, which is not always adhered to. This latter provision is important as it insures contact of the incisal edges during the incising function produced by the slightly protruding lower jaw at that time. Now, while this procedure may not be precisely in accordance with our great master, Dr. Bonwill, who contributed largely of his genius for our enlightenment to this specialty, yet there are hints arrived at from my own practical experience. Dr. Bonwill's articulator was the best of its kind for many years and served its purpose well, and while better and more scientifically constructed articulators are now on the market, they are simply the product of afterthought and improvement.

In passing beyond the six anterior teeth, I think it an error to retain in either upper or lower set a lingual cusp of much prominence on the first bicuspid tooth. I think in either jaw, especially the lower, it should be diminutive, thus corresponding more to natural teeth. The idea of the antero-lateral portion of the tongue, where it is the thinnest, being suddenly called upon to narrow itself down and confine its edges within the prominently projecting lingual cusps of the first bicuspids is wrong, as there should be a gradual slope from the thin incisal walls back to the broader grinding surfaces of the second bicuspids and molars, and in this respect the manufacturers should try to follow out nature's intentions a little more closely. Some sets of artificial teeth have this provision made, but those of later molds have both bicuspids alike in size.

It will be noted that as we pass still further back we see the molar teeth often misplaced, and no respect to the angles of force in masti-

cation observed. The general fault or error seems to be a widening of the arch, and it is rarely if ever too much contracted. The molars on this account run out over the buccal sides of the ridges, and the plates are displaced in consequence during the act of mastication. The molars could hardly be placed in too far lingually, as all stress in mastication would be either towards the ridges or just inside, which would help to retain the plates in position. The common error of a faulty constructed artificial denture is the tendency of the molars to run out into the cheek where there is no stability nor room for the appliance and where the muscles and glands of the face are apt to fall between the masticating surfaces of the molars to an annoying degree. Anatomists tell us that in the normal occlusion of the natural teeth the entire upper arch is wider than the lower, and that the upper teeth all around should overlap the lowers. I hardly agree with those who say we should imitate the natural arrangement with our artificial teeth in this respect, for if we observe the great majority of edentulous arches we will note that the anterior portion of the upper arch describes a wider segment than the lower, while as the jaws extend to the rear the reverse is the rule. While I believe it proper to have the upper anterior teeth extend beyond the lowers and slightly overlap them, I think as we get to the bicuspids the buccal surfaces of both uppers and lowers should be on the same vertical plane, then as we get to the first molars above, they should be placed slightly inside of the buccal edges of the inferior molars, and the second molars above should then drop into a position where their bucco-occlusal edges would strike about midway of the buccal surface of the second lower molars.

Summing up this arrangement of the arches, the upper should describe a wider circle anteriorly, and a smaller one posteriorly than the lower. I know that Dr. Bonwill advocated the arrangement of the bicuspids and molars in almost a straight line back from the cuspids, but that in many cases would land the last molar, especially in the upper, too far out into the cheek, and cause instability of the denture.

VARIOUS REFORMS IN PROSTHODONTIA.

PAPER BY STEWART J. SPENCE, D.D.S., CHATTANOOGA, TENN.

As my object in presenting to you this paper is to set forth the claims of various reform methods in dental prosthesis rather than to offer something entirely new, I must crave pardon for saying some things which may seem to some of you like thrashing over old straw, and I offer as apology that these things are none too well known, and certainly not enough appreciated. I shall, however, present an idea or two which are, I think, original; but it remains to be seen whether or no you will say of my essay as was once said by a good preacher of another preacher's sermon, "He said some new things and some good things; but the good things were not new, and the new things were not good."

I will not detain you by lamentations over the decadence of plate work and the greater prominence given to other fields of dentistry. Suffice it to say, "These things ought ye to have done, and not to have left the other undone." While the need for plate work exists, which, despite all the advances made on other lines, is likely to be for some time yet, that which is done ought to be well done. Is it well done? For instance, is the prosthetic dentistry of the present day always sent forth correctly articulated? Shade of the mighty Bonwill, we blush to answer! It may be that the experience of my hearers has been more pleasant than mine in studying the occlusion of plates which have come into their hands during the last decade or two, but if not, perhaps the least said about it the better, for fear we awake from his last sleep the great apostle of articulation and bring down upon our heads his angry rebuke. Without going fully into the Bonwillian system of occlusion—or, as he preferred to call it, articulation—let us glance at its salient points. He taught that a proper intermeshing of the cusps and occlusion of the grinding surfaces would both aid stability of the plate and better

serve the purpose of mastication. The lower jaw has four general movements, namely, (1) the vertical or up and down movement; (2 and 3) the two lateral movements, right and left, and (4) the protruding. Dr. Bonwill has shown that the teeth can be so adjusted on the plate that when the jaws are closed in making either of these four movements, contact of the teeth may be retained in at least three opposite places, thus preventing the loosening of the plate on one side of the mouth while biting on the other, or of the posterior portions while occluding at the incisors.

There are articulating frames on the market—notably Bonwill's—which give with close approximation to correctness these four movements of the mandible, and these ought everywhere to be substituted for the old-style articulators, which give only the hinge or vertical movement. A fact of importance, however, for which these improved articulators make no provision, is that if the model is not placed in the frames at the same distance forward from the condyles of the articulators as in the patient, the bite cannot be afterwards opened or shut without deranging the occlusion. On this point Bonwill only directed that the median line at the incisal edges of the lower incisors should be about four inches from the condyles of the articulating frame, but Dr. G. B. Snow has introduced an instrument which will give the correct distance in each case, by employing which your essayist has found that the ordinary distance is rarely more than 3½ inches. This instrument is of value for several reasons, but chiefly that unless the articulating bite has been so taken as to need neither opening nor closing after being transferred to the articulating frame, there will be, if such alteration is made—unless the model has by chance been placed at the correct distance from the condyles—a derangement of the occlusion whereby the molars will be found occluding too soon from a thus-opened bite, and in a thus-closed bite the reverse malocclusion will result, the incisors occluding too soon.

This subject of articulation naturally leads us on to our next subject—that of the need of reform in the dimensions of the grinding surfaces of porcelain teeth. For some inscrutable reason the manufacturers often make artificial sets of teeth having bicuspids with only two-thirds, and molars with only one-half, the area of grinding surface found in nature, and then they leave out one large molar entirely, thus reducing the occlusal area to less than half that of

Mother Nature. Are we wiser than she, that we do this? It is argued by the advocates of the small molar that its lesser surface allows it to be more penetrating than the large one, and that it therefore better comminutes food. Now, this argument might be of force if man were an entirely carnivorous animal, but as he is largely a vegetable eater it is of little weight, for the reason that vegetables are, as a rule, easily enough comminuted if only they can be once brought between the upper and nether millstones of the oral mill, but are quite apt to elude their grasp and be swallowed uncrushed, and of course the smaller the teeth the more is this liable to occur. Beans, corn, grape seeds and pieces of radish, celery, onions, etc., not infrequently run the gauntlet of the entire alimentary canal and escape unbroken, acting as irritants as they go. On the other hand, flesh is usually digested in the stomach, even when swallowed in large pieces. The carnivora chew their food but little; the herbivora, much. Another argument against the small bicuspid and molar is, that their inferior size prevents correct articulation. With only two small molars, instead of three large ones, it is impossible to give that curve to the line of occlusal surface which, when the mandible is protruded in biting, brings the upper and lower molars in contact at the same time that the incisors come in contact; I say, this is impossible without making said curve so abrupt that the upper plate is liable to be pushed forward in biting, as by a tilted third lower molar. The small bicuspid is also unfavorable to good articulation when the lateral bite is made, because its inner cusp has passed out and beyond the outer cusp of the opposing tooth when they ought still to remain in contact.

The true artist in dental prosthesis could weep to see the defiance of nature exhibited by the manufacturers in giving to each tooth of the set the same unlifelike uniformity of shade. Centrals, laterals, cuspids, bicuspids and molars are all of one shade! Surely, it would be an easy matter to put a little more coloring matter into a cuspid or a molar. Then, again, those horrid spaces between the gum section teeth! Do they not in nature lean up against each other for mutual support like—to use Dr. J. D. White's figure—staves in a barrel? Continuous-gum work is ideal. It combines the excellence of the plain tooth—to-wit, its adaptability to any desired position—with the beauty of gum sections, minus the objectionable joints and spaced teeth of the latter. Unfortunately, however, the continuous-gum

plate is too costly for most folks. After indulging in the luxury of supporting our royal family, the lords Vanderbilt, Rockefeller, Morgan et al, the free and enlightened, but sadly impoverished, American citizen finds himself with but little cash to spend on dentistry. Could we not, therefore, make a compromise between the high-priced continuous-gum plate and the dull pink vulcanite plate, by adapting continuous porcelain gums to the vulcanite base, and sending our waxed-up dentures to the manufacturers to be returned later with porcelain gums substituted for the wax ones—at least as far back as the second bicuspids? Since a manufacturer can make an entire set of teeth for a dollar or two, surely he could, if he had enough of this work to do, supply us with these continuous gums at a moderate price.

Another needed reform is the larger use of aluminum instead of vulcanite for baseplates. This metal conducts thermal changes better than any other except silver, thus tending to lessen inflammation of the membrane and make hot and cold drinks more palatable than does vulcanite. Aluminum is strong, easily cleaned and very light. Vulcanite attaches to it as though each were made for the other. It is very easily swaged, being conformable to hard plaster dies by the use of screw pressure, instead of the hammer, in swaging. It is less liable to misfit than vulcanite, because of the shrinkage in cooling of the latter and the swelling of the model in vulcanizing, and its compression in flask-closing. If it breaks—as it is not very apt to do—it may readily be repaired with vulcanite.

On the subject of shrinkage of vulcanite plates more ought to be known, and especially on the means of its prevention. As the uncontrolled expansion of a 3-inch bar of vulcanite is nearly one-sixteenth of an inch at the first vulcanization, and increases with each additional vulcanization up to the fifth or sixth, by which time it reaches one-eighth inch, it follows that a plate of vulcanite changes shape very seriously in cooling. A very hard plaster will control successfully the contraction of the length and breadth of the plate, but that of its thickness does not come under the domain of the investment. I have found by experiment that a plate three-quarters inch thick over the ridge shrinks nearly one-fiftieth inch in thickness at first vulcanization. Now, as this contraction depresses the vulcanite that rests on the ridge, it acts on the fit of the plate as though it raised that of the palate, thus producing a rocking plate.

Your essayist has found that the contraction of the thickness of a plate can be prevented by the use of the long-rooted teeth made for continuous-gum work, but as these are not always at hand, he employs in actual practice bars of serrated platinoid sunk vertically in the thick portions of the rubber. These can be easily held in place if inserted when the case is about three-fourths packed, and they are better if bent into forms resembling carpet tacks or the letter U, placed points downwards. Another method is to drill three or four rows of pits in the model, one on the ridge and the others on the adjoining slopes. As these pits fill with rubber during flask-closing, they produce spurs of vulcanite which bind the model to the vulcanite during cooling. A second vulcanization, however, would work havoc with a plate made by this latter method, by permitting contraction, while one made with the internal serrated bars of platinoid would retain its form.

To guard against the contraction of vulcanite while permitting the expansion of plaster of Paris is like locking the back door and leaving the front one open. Indeed, it appears probable that many plates are rescued from the ruin to which plaster of Paris would consign them by means of this contraction of the vulcanite, one evil tending to counteract the other. (I refer now to contraction of the area of a plate, not of that of its thickness.) All plaster of Paris expands in setting, some brands more than others. A sufficient force will prevent this expansion, as a sufficient force will prevent the contraction of vulcanite, but as we use plaster of Paris in our art this force is not applied. In an impression taken in plaster of Paris the buccal flanges of the impression cup offer a partial resistance to this areal expansion; from this no benefit results, for the plaster in its effort to spread out its molecules, being restrained by these flanges, finds relief in bowing up at the palatal dome of the impression. In the model something similar takes place. Vertical expansion also to some extent works mischief with a model. If the model were equally thick in all places its vertical expansion would of course be equal over all, and so would effect no relative change, but in all models, especially those of high palates, the palatal thickness is much less than that of the ridge, and consequently vertical expansion is greater at the ridge. Thus, in every plaster of Paris model and impression there is distortion, due to both areal and vertical expansion, besides the warpage consisting in the bulging upwards of the

palatal dome from the restraint of tray's flanges. Nor is this all.

Another yet larger expansion occurs in the vulcanizer, due to the action of steam on the plaster. This latter expansion of the model is not much lessened by the pressure of the rubber against it, because (as experiments show) the expansion of the model takes place in the early stage of vulcanization, at which time the rubber is so soft from high heat as to offer but little resistance, and the plaster has not yet become soft. The expansion and contraction of plaster of Paris from change of temperature is so small that it may be ignored. Even if a model were to appreciably expand from heat when at 320° this would not affect the fit of the plate, because the shrinkage of the vulcanite in cooling causes it to conform to the shape of the model when it has cooled down to 130°, this being the point at which vulcanite contraction ceases. Still another evil lurks in the way to rob of its adaptation to the jaw a vulcanite plate which has been made upon a plaster of Paris model, namely, the compression of the model during flask closing. If any one doubts that so soft a substance as rubber will compress so hard a substance as plaster of Paris, let him reflect that rubber, like all compressible substances, becomes hard under pressure; then, if he still doubts, let him make the following simple and easy experiment: Having filled the lower section of a vulcanizing flask with plaster of Paris, soap its surface, and fill over it the upper section. When set, open, and place between these two plaster surfaces a lump of rubber, having previously coated said surfaces with tin foil to prevent adhesion of rubber to plaster, then close the flask in boiling water. On reopening the flask the experimenter will find that the rubber has sunk a bed for itself in the plaster, the depth of which can be seen by cutting in twain the disc of rubber. Coal oil, chloroform, benzoline, and other solvents of rubber will do away with this difficulty very thoroughly, but are open to the objections that they somewhat injure the quality of the rubber and greatly retard its vulcanization.

In closing let me present a method, original, I believe, of obtaining a correct closure of the jaws in taking the articulating impression. We know that the mandible is apt to protrude, and, in a less degree, move sideways. My method makes either of these mismovements more difficult to the patient and if correctly done it renders the protrusion impossible. It consists in the use of a piece of silk cord, about 2 feet long and 1-12 inch thick, so wound as to be

devoid of stretch. This cord is passed around from the back of the neck, where it is tied in one fold, and then its ends are placed in the hands of the patient, who is directed to pull on them very forcibly at the time the bite is taken. Of course, it hurts a little, but it is intended that it shall do so, this also being the reason why the cord is no thicker. The patient is made to sit upright, with the head thrown back, and usually the precaution is taken of making a preliminary closure, directing the patient to pull very strongly on the cord, before taking the decisive bite. If he is apparently not pulling very hard, insist on his doing so until it hurts. When satisfied that he is making an honest effort, proceed to take the bite. If the method you employ for doing this is that which is known as the "squash" or "mush" bite, the wax must, of course, be left out of the mouth during the preliminary closures. When this simple operation is thoroughly performed it renders impossible any protrusion of the mandible. I have given twenty-five years of study to the subject of the articulating impression, and was, I believe, the first to publish the method which has now become so well known through the Truebite plates; now, however, I give the palm to the little silk cord.

In reviewing the various reforms advocated in this paper, I am impressed, not altogether pleasantly, with the fact that they each involve more skill and effort than the methods they are meant to substitute. This ought not to deter us, for progress is almost always associated with an increase in complication, not in simplicity; the sewing-machine is more complicated than the hand-sewing needle, and the great Hoe printing press than that used by Benjamin Franklin. So with nearly every other line of human progress, and if we would advance as a profession we must be willing to meet with more and more difficult, complicated and scientific modes of operation.

THE PRESERVATION OF DECIDUOUS MOLARS AND CUSPIDS.

PAPER BY N. N. VANN, D.D.S., ATTALLA, ALA.

If parents would only forget for a period that the first set of teeth which nature has so wisely given to children is deciduous inestimable good would redound to all future generations, but with "temporary," "first," "baby," "milk" teeth and other synonomous terms ever before them they forget their real meaning and apparently conclude that anything which is temporary is of no value, especially if some trouble and expense are necessary to its maintenance. They should remember that while these words signify shortness of duration it is a definite duration, and the premature loss of these teeth is disastrous. The average guardian estimates the deciduous teeth about the same as the terrible three-months colic—"of but few days and full of trouble."

Eruption of First Temporary Teeth.—The appearance of the first deciduous tooth is an important epoch in the child's history, for after the youngster has bitten continuously every accessible article from the thimble to its mother's chin, and passed many sleepless hours, and been drenched with countless doses of the various soothing syrups, asafetida and other toothsome delicacies, the fond, careworn mother, having followed the advice of her enlightened (?) family physician "to let nature take its course," at last detects the sharp cusp with her finger. The father is 'phoned to come home in great haste, and letters are written to grandparents, uncles and aunts, bearing the good news that "the lost is found" and that he who was almost dead is alive. Yes, I repeat with emphasis, it is one of the most important epochs in the history of a human being. Nature has begun planting two rows of beautiful and indispensable pearls, upon whose preservation hinges to a great extent the future health, beauty and intellect of their possessor. "But 'tis true, 'tis

pity, and pity 'tis 'tis true" that within a short time many of these very proud guardians tell the dentist to "pull them out; they are only baby teeth and are not worth saving." Oh, foolish ones, think you that the Creator would subject this tender infant to the dangerous ordeals of first dentition if the teeth were of so little value? Oh, that we could convince parents of their intrinsic value, and that by preserving them the little one would be free from pain, could properly masticate his food, and the perfection of the arch for the permanent teeth would be maintained. Adults readily appreciate the importance of alleviating pain, therefore the greater task for the dentist is to convince them of the importance of thorough mastication and preservation of the arch.

Mastication.—Thorough mastication and insalivation are prerequisites to digestion. Either faulty mastication or insalivation or both are forerunners of indigestion with all of its attending evils. If one has a perfect set of teeth until old age and then becomes edentulous he may never suffer from indigestion. The reason is very plain—he has acquired the habit of thorough mastication, and though he be toothless yet he will thoroughly chew his food, perfectly insalivating it. Not so with the one whose deciduous teeth were prematurely rendered incapable of performing their function. Not infrequently is it the case that caries, which develops so rapidly at that age, has destroyed almost the entire crown of the molar and is not detected until pain, nature's only danger signal, is experienced when hard particles of food, cold water, acids or sweets are impacted into the cavity during mastication. The child at once carefully places his food on the opposite side and guards at all times his sensitive tooth. Unilateral mastication is not thorough mastication at any age, and especially not in the mouths of children, the space being very small and the child tending to eat hurriedly. Since neither side is immune, if the dentist is not consulted the molars on the opposite side before long are fully as badly broken down and mastication becomes a painful ordeal. Soon the little sufferer is compelled to swallow his food unmasticated and not insalivated, the avoidance of pain, and in many instances the dentist, being his prime object. The sensitive teeth can be treated by the skillful dentist and be made to render good service for their allotted time, but the habit of swallowing food unmasticated when once acquired is corrected by very few. Hence we see many adults with all their permanent teeth in

situ who do not properly masticate their food and are consequently afflicted with indigestion.

Preservation of the Arch.—Every dentist knows that as the boards placed in position before the pouring of a concrete wall are essential to the beauty and usefulness of the permanent structure, just so the temporary teeth, arranged by an all-wise Creator, are expected to remain and jealously guard the space until time for eruption of their successors. The sequelæ to premature loss are too well known for me to attempt to enumerate them.

Classes of Cavities.—In order to better discuss the different classes of cavities I will take them up separately.

Superficial Cavities.—Many times all that is necessary is to thoroughly polish away the decay and stain with silver nitrate. I might say that it is my custom to stain all cavities, whether followed by filling or not, in posterior temporary teeth with silver nitrate. Should the cavity be so deep as to require filling amalgam is the material that should be used in occlusal cavities, having first lined the cavity with a resinous solution. In small proximal cavities when convenient the teeth should be separated by previously packing cotton into the cavity and allowing it to remain for a few hours. This enables the dentist to better fill the tooth, restoring the contour and thereby preserving the arch. When the teeth are separated these cavities, if not too badly decayed, can be filled without cutting through to the occlusal surface, and should be filled with either copper amalgam or gutta-percha. However, in most cases they have already broken through and should be prepared and filled with amalgam, cutting away the frail walls and securing anchorage on the occlusal surface as in permanent teeth. Under the head of superficial cavities we usually find caries in the cuspids. Owing to the fact that they are not so susceptible to decay many remain throughout their allotted time without deteriorating at all, and their location being more conspicuous caries is easily detected by the parent, or by the dentist while treating the molars. Cavities on the distal surface should be filled with gutta-percha, while those on the mesial should be filled with cement. Often there is not sufficient room for the eruption of the permanent lateral incisor, and the dentist is asked to extract the temporary cuspid "to make room" for the approaching lateral. This should never be done, since the premature loss of these teeth lessens room.

Deep Cavities.—Could we always see our patients while the cavities are small and shallow we would experience no trouble in preserving the teeth and retaining our patients, but in most cases trouble is encountered before the dentist is consulted. Great care should be taken to not inflict unnecessary pain in breaking down the frail walls. The point of the instrument should be so guided that it will not plunge into the bottom of the cavity but force toward the wall. In almost every case both occlusal and proximal surfaces are badly decayed, and the two cavities should be united. If the child becomes too nervous the cavity should be packed with a pledget of cotton saturated with Fletcher's carbolized resin or one of the essential oils and sealed in with temporary stopping, and the patient dismissed for a few days. The decay can usually be removed with little trouble when the child returns, but if the tooth is still sensitive the cavity should be washed out with warm water, and a paste made of cocain crystals and carbolic acid applied; follow this with soft wax and use pressure as in removing the pulp. By placing a pledget of cotton saturated with alcohol on the soft wax before using pressure injury to the soft tissues by the carbolic acid will be prevented, the alcohol neutralizing it. The soft tissues should also be protected and precaution taken by the use of cotton rolls or napkins to prevent the medicament escaping into the mouth and throat. The decay can then be removed very easily. While our chief object is preservation of the teeth, yet we must by all means retain our patients, for on this hinges success. If the pulp is not too near amalgam is the best filling material, and I have had good results from the use of copper amalgam where the proximity of the pulp would forbid other amalgams. This material is not a panacea, but it is less irritating, requires very little retentive form, and in cases where it is impossible to keep the parts perfectly dry it is supreme. If the proximal surface of the adjoining tooth is also decayed only one should be filled at a sitting. The matrix should be used when the patient will allow it, and the proximal surfaces should be well contoured, thereby preserving the arch and rendering thorough mastication possible. Where closeness of the pulp forbids the use of amalgams, gutta-percha and cement—preferably oxyphosphate of copper cement—must be used. These materials must be watched closely, as they are only temporary in this class of cavities. Cements wash out at the gum margins and the pulp is exposed before either

the dentist or the patient suspects deterioration. Gutta-percha is not deceptive and in some cases withstands mastication for a long time, but in most occlusal cavities it is soon detrite and must be replaced. It is not necessary that the walls be perfectly smooth, as uneven walls help retain gutta-percha. In case the adjoining tooth is badly decayed the material should be bridged over, using a metal guard to protect the gum. Continued mastication on this will cause spreading of the teeth, and in many cases this is beneficial, the posterior tooth having dropped, there being no resistance after the proximal surfaces of the lower one were broken down. Where the retentive form is inadequate for gutta-percha cement should be used. The filling should be coated with paraffin for protection against the fluids of the mouth, or warm temporary stopping held under the finger will protect it for a while.

Pulps Exposed.—After removing the debris with warm water, if the patient is not very nervous one can by thoroughly protecting the soft tissues with cotton rolls or a napkin remove the pulp by pressure anesthesia, using a paste of carbolic acid and cocain crystals. Where this is contraindicated a paste made of oil of cloves, iodoform and a crystal of cocain should be applied to the pulp and sealed. The patient should then be dismissed with instructions to return when the tooth becomes sore. This may be in a fortnight or it may never give any further trouble. When the patient returns the pulp should be removed, the canals treated once or twice, and then filled with forma-percha, followed by gutta-percha. It is best not to fill the cavity in the tooth at the same sitting the pulp canal is filled, on account of the difficulty encountered in removing the amalgam filling should soreness supervene. At another sitting the tooth should be filled with great care, restoring contour and the cusps the same as with the permanent teeth.

Pulpless Deciduous Molars.—The treatment of these teeth is very similar to the treatment of the permanent ones. Children's teeth cannot be treated with as much certainty as those of an adult and the treatment therefore should always be tentative. We are amidst many difficulties when we attempt to preserve broken-down teeth for children, and we should spare no efforts to restore them to usefulness lest we are forced to extract, thereby causing the parent to reassert that it is folly to attempt to save a temporary tooth. The roots are small and divergent, the canals difficult to open, but this should

be done as thoroughly as possible. Abscesses with fistulous openings should have several treatments, pumping the medicament through the fistula, then filling the canal with a solution of chloropercha and aristol, pumping it through the fistula, then packing the canal with gutta-percha. At a later sitting the tooth can be filled as heretofore described. We are never fully remunerated financially for saving deciduous teeth, but nature builded well and it is our duty to preserve her workmanship.

DISCUSSION. *Dr. R. H. Jones,* Winston, N. C.: If there is one phase of dentistry that has been neglected by the profession it is the proper care of the temporary teeth. As the foundation of a building should be well laid, so the deciduous teeth should receive the greatest care as being the foundation of the permanent set. It is worth all we do and all we charge if we simply alleviate the pain, for these patients frequently come to us with an aching tooth which has cost them several nights of sleep. I would emphasize the feature of mastication, for who has not seen these little sufferers with nothing but a few stumps and shells with which to chew their food, which condition cannot help but impair their health? Too often parents do not realize the importance of keeping the first teeth in order that there shall be plenty of room for the second ones. They insist on the extraction of the deciduous teeth at the first symptom of pain, but we should never allow ourselves to be forced to extract these teeth for that cause.

As regards filling the temporary teeth, I do not agree with the essayist that copper amalgam is the ideal material. Gutta-percha is best in many cases, particularly in proximal cavities where decay has not progressed so far that you have to cut into the occluding surface. I have little confidence in cement fillings, as they must be looked after constantly and are treacherous, particularly near the gum line. For the occluding surface tin or tin and gold are easily inserted, and if properly made the fillings will last as long as the teeth. One eminent member of the profession will not use amalgam because he says that where teeth are filled with it the roots are not properly absorbed.

I should like to emphasize the fact that by the extraction of the deciduous teeth irregularity is caused, especially of the front teeth in the permanent arch. The destruction of the temporary molars

and cuspids by decay also brings about a very bad condition of the mouth and tends to injure the first permanent molars.

Dr. L. P. Dotterer, Charleston, S. C.: No subject can be of more importance than the preservation of the temporary teeth. I am not fond of it, but I think it should be a part of our education to learn to handle children. If we can gain their confidence and make them look upon us as their friends we can do almost anything with them. It is all well and good to talk about the mother scaring them, but we must recognize the fact as it presents itself. We should remember that the child has been suffering from toothache, and that his nerves are in no condition to permit of a lengthy operation. The greatest mistake is made in endeavoring to do everything at the first sitting, as it should be devoted to some palliative treatment and to gaining the confidence of the child. If our patients do not appreciate the importance of keeping these teeth I think the burden will lie upon the dental profession, and if we save the organs the parents are usually willing to pay the fee.

So far as filling materials are concerned, I have had no experience with copper amalgam, and I don't approve of gutta-percha because it swells after a time, spreading the tooth, and also wears down. I can recommend most heartily oxyphosphate of copper cement for filling children's teeth. It may be used on the grinding surface, but is especially efficacious in proximal cavities. It can be used in cavities where dryness is out of the question, and its wearing qualities are remarkable. With it I have filled the teeth of children two or three years old, and it has lasted for three or four years without further attention. The fillings that have been worn away by mastication have left the surfaces under them with a black deposit which is impervious to decay.

Dr. D. D. Smith, Philadelphia: From the standpoint of the profession at the present time this paper and the discussion on it seem to be orthodox—right along the old line of letting the teeth go to ruin and then trying to save them. To save these deciduous teeth is an important office of dentistry, but we shall not accomplish this object until we change our methods. You may use any material, and may see the children as early as you please for filling, but there are many teeth that you cannot save by such treatment. A great deal of suffering may be relieved, but every dentist knows that perfect operations in children's mouths are almost impossible, and

work upon the temporary teeth is passed over because of the attendant difficulties. Why do we not comprehend the causes of disease and decay in these and in all teeth and help nature to bring about better conditions? Prevent the breaking down and the building up will not be required.

We have not yet come to a correct understanding of what the teeth are intended for. The present emphasis is upon mastication, but they are not necessary to mastication. They are important for our comfort and it is quite worth our while to preserve them, but they are not necessary for the preservation of health. Neither tooth mastication nor mouth insalivation is a necessary process to health. If you or any medical man in this country had a patient whose life depended on assimilating nourishment you would not look to foods requiring mastication, but would give foods that could be taken into the stomach without mastication or insalivation, and in that way only could the patient's health be restored. Now, if we can restore health to the invalid without the aid of the teeth, why can we not in the same way maintain normal conditions in health? Comminution of food can be done quite as well out of the mouth as in it. Free and comfortable mastication contributes greatly to the pleasures of taste and ingestion, and to that extent favors stomach digestion, but mouth mastication is an office which can be delegated, as is often done, not only without injury, but with decided benefit. It is fallacious to think that insalivation is a necessary process. The fact that saliva in the initial stages of digestion converts starch into sugar may have been a matter of more consideration before sugar entered so largely into foods and drinks as at present. Now, with the constant oversupply of saccharines saliva, frequently vitiated and infected as it is poured into the mouth, a direct secretion by the salivary glands might in many mouth conditions give place to water in some form to advantage. We may regard water not simply as a food adjuvant and a dilutant to the circulation, but as an integral part of nutrition, as necessary to digestion as to tissue replacement and to the maintenance of life. According to present teaching these ideas are heterodox, but it will not be long when they will be considered strictly orthodox.

I wish I could impress upon you not only the newer methods for preserving children's teeth, but also how to preserve the health and beauty of childhood. We must assist the development of the

alveolar process for the proper and regular eruption of the permanent teeth, and facilitate the absorption of the roots of the temporary teeth so that they may be thrown off in the natural way. I began the prophylaxis treatment of which I would speak with my own grandchildren. Their mouth conditions were such at two years of age that I saw if the teeth were let alone there would be decay and suffering before three years of age. I began by removing the cause, which was in their mouths and on their teeth, and as they were my children I sought to make the operation a sort of frolic, being careful not to occasion pain in any way, but always to end the sitting with a clean mouth and clean teeth. Once a week the infection was polished off the labial surfaces of the teeth with the orange-wood stick and pumice stone, and at end of four weeks there was a wonderful improvement in the condition of the teeth. I was then encouraged to carry the good work on to all surfaces, but there were no instruments or appliances suited to the work. I finally found one of Jack's old porte polishers and with this was able to reach surfaces previously inaccessible. I extended the surfaces treated and kept on with the work of removing the infection—you may call it polishing if you choose—with the result that the children came to the period of shedding their temporary teeth with as good mouth conditions as could be imagined. The teeth were clear, translucent, living organs without even a suspicion of decay, and the roots were taken up and the crowns shed in their regular order without interference or even the application of a string. If time permitted I could give you the history of cases in practice even more convincing than these, cases where by this prophylaxis treatment there was an arrest of destructive caries already established, and a restoration and maintenance of general health conditions.

Dr. J. P. Gray, Nashville: Dr. Smith spoke of physicians giving easily assimilated foods in the treatment of diseases, but he forgot to tell you that so soon as the patient recovers sufficiently the very best physicians will put him on a diet requiring mastication—on beef and other meats that should be taken into the stomach only after thorough mastication. I believe that mastication is absolutely necessary for health and that we should retain the teeth to aid the process. Dr. Smith's idea of treating children's teeth is a good one, and if we had them constantly under our care we could treat their teeth as he did and there would then be but little decay. That, how-

ever, is nothing more than the ordinary practitioner does. He removes the cause, but he does not have the children constantly at hand so that he can remove the accumulating affection, so the teeth decay. Let us remember that we are dealing to-day with people who are ignorant regarding the care of their teeth. The medical profession knows little about it, and I am sorry to say that even the dental profession does not know as much as it should regarding the care necessary for the preservation of children's teeth. We should impress upon parents the idea that children must be brought to us at or before the eruption of the temporary teeth, and if that is done there will be little trouble with the first set. It is not done, however, so the children are brought to us with their teeth badly broken down and there is nothing for us to do but treat them. It has long been a custom of the profession to charge little for children's work, but I think we should charge a good price and thus be able to take sufficient time to do the work well.

Dr. Joseph Head, Philadelphia: The care of children's teeth is of the utmost importance and I would second Dr. Smith's remark that our efforts should be in the direction of prophylaxis. The dental profession is in an atmosphere of prophylaxis, and ever since Miller and Black discovered that infection does not come from within the tooth, but from without, the profession has realized that decay can be prevented by cleanliness. It is evident that the greater number of cavities which form in the teeth of children between the ages of five and fifteen are due primarily to the fact that the teeth have not been kept clean, and that germs have been allowed to collect and erode the enamel to such an extent that it is never again normal. The mothers must be taught that each morning floss silk should be passed between every tooth in the child's mouth, and then followed with a brush and powder or a wash. If that is done few cavities will ever form, and those that do can be readily treated.

I do not at all agree with Dr. Smith's views regarding mastication and insalivation. For a quarter of a century Dr. Arthur said that the enamel between the teeth was unnecessary because it decayed, but after sacrificing thousands of teeth the profession found that God was right and Dr. Arthur was wrong. We should be very careful about accepting a statement that Divine Providence has made a mistake in creating certain organs. Did the Lord make a mistake or was he merely fooling when he put ptyalin into the

saliva for the purpose of changing starch into sugar, in order that there might be some digestion in the mouth before the food reached the stomach? Zwieback is given for indigestion because it is hard and has to be chewed, and if mastication causes the food to be covered with saliva and thus makes it more easily swallowed you may be certain that it is done to fulfill a useful purpose.

Dr. Richard Grady, Annapolis, Md.: I think Dr. Smith's statement that the teeth are of no value for mastication and insalivation should be challenged, for it will not do for such teaching to go forth from this or any dental association. The London *Lancet* recently published four articles entitled "Observations on Mastication," and no one who read same could fail to be convinced of the importance of mastication in the process of digestion. I understood the essayist to say that if the temporary teeth were preserved throughout their life, the patient forming the habit of thorough mastication, that habit would continue if he should become edentulous in adult life. When one has attained full growth it may not matter much whether the food is masticated by natural or artificial means, providing it is properly done, but with children it is a different matter, and the state of our children's teeth is a question of national importance.

Dr. Smith: We all know of the Boston medical man who sets up the ridiculous claim that these teeth are disappearing because nature means that we shall not indulge in the same kinds of food later in life as in youth and early manhood. Who would dare assert that all adults must have the same kind of food or that all kinds require teeth for mastication? The teeth are a source of great comfort, and are useful, but not indispensable for mastication, but in most cases it would be a thousandfold better to lose all the natural teeth and depend entirely upon liquid foods for sustenance than to carry perpetually in the month the awful infection which is found cemented to the surfaces of the teeth.

Dr. A. C. Hewitt, Chicago: Let me tell you of the horrible suggestion which was made by a professional man some forty years ago. He said that mothers suffered pain in labor because of the bony structure in the infant, and advised feeding the mother in such a way that the child's bones should be nothing more than gristle. His idea was to destroy the child merely to save the mother some pain, but if any mother loves her offspring she will not want

to bring a child into the world without a backbone. We must feed the child through the mother if it is to have perfect teeth, and the proper time for us to exercise our skill and our care along the lines of dental hygiene is when the baby growth has begun. Nature put teeth into the child's mouth with the idea that he would prepare his food for his stomach by mastication, and when civilization has progressed so far that our food is so tender and so carefully prepared that we need no teeth for predigestion, then God pity us.

Dr. M. L. Rhein, New York: I claim that the simile used by Dr. Smith is absolutely false and erroneous. I never heard of a medical man prescribing predigested foods so that they could be to a certain extent assimilated by the stomach unless there were grave reasons therefor. Such methods are resorted to only when the patient's system is in such a debilitated condition that food cannot be introduced in the ordinary way. On the other hand, all the experience in therapeutics which we have had during the past few years has tended only to answer the question, "How long can a patient be kept alive on this kind of nourishment?" When you come to clinical experience in this matter there is probably no practitioner who cannot recollect cases where patients suffering from indigestion have had it controlled and cured merely by the supplying of proper prosthetic appliances so that by artificial means mastication could be performed as nature intended it should be. Such cases are amply sufficient to refute an empirical statement that has nothing to substantiate it.

Dr. H. A. Smith, Cincinnati: In the institution with which I am connected we have a large number of children from asylums, and we have complete control of their dentures from six to ten years. Little work is necessary for them, simply because they are brought to us regularly. All the trouble is overcome if we can impress the managers of the asylums with the importance of letting us see the children's teeth every three months. We have instructed these children in oral hygiene for years, they are obliged to attend to their teeth, and the result is that the teeth have been improving all the time. The results are very different indeed as compared with an equal number of patients from the general public, for the latter children are brought to us only when suffering pain, and we cannot then do the right thing for them.

I believe that teeth are essential physiologically for mastication.

It is commonly agreed that the preservation of the first teeth is essential to the proper development and preservation of the second set, but according to such an eminent authority as Charles Tomes this is not true. I should not like to advocate the opinion that the first teeth should not be preserved, but there are plenty of children who become edentulous at an early age and yet survive. The idea of feeding the mother is good to a certain extent and she should have good food all of the time, but we must not give too much attention to that feature from a dental point of view.

Dr. D. D. Smith: There has been a misconception of what I intended to say. If you will only look you can see on every hand illustrations of the fact that teeth are not necessary for mastication. The best conditions of health in old people are found among those who are without any natural teeth at all. Show me an old person and I will show you an individual practically without natural teeth. Many get along very well with one or two teeth in the upper jaw and hardly more in the lower, or vice versa, and maintain a species of mastication equivalent to ordinary mouth conditions. Although children may have poor teeth, they masticate practically as well as others and do not bolt their food as many suppose. My contention is that in many instances the stomach does its work very much better if the food is not mixed with the saliva. The man, woman or child that loses the natural teeth loses a vast amount of satisfaction and comfort—an invaluable thing, for there is nothing more valuable to the human system than a good set of teeth. I am trying to impress upon the dental profession that it should give humanity a set of regular, good and useful teeth. I am not contending that the teeth should be lightly thrown away, for they are rather to be made good and permanently saved.

Dr. Hewitt: I would ask Dr. Smith if he ever knew of an individual ninety-five years of age or older who did not have his natural set of teeth?

Dr. Smith: I am glad of that question, although it would be more pertinent to ask how many people over sixty-five years of age I have known to retain their natural teeth and enjoy good health. The old people of to-day are generally without natural teeth, and the individual who lives beyond the age of seventy and retains any considerable number of them is the conspicuous exception. Twelve years ago one of the richest men in Philadelphia was supposed to be

on his death bed. Like many another man he had suffered all his life from slow systemic poisoning due to the infection perpetually on the surfaces of his natural teeth. Through a period of seventy years the gradual accumulation of septic matter had never ceased nor had it been removed. The supporting structures had gradually given way and been absorbed, leaving a constantly increasing tooth surface exposed to infection. Tooth after tooth had been lost until the number had been reduced to about twelve, and they were so loose as to be a hindrance rather than an aid to mastication. Furthermore, they presented conditions and surfaces which made cleansing impossible, and there was enough virulent infection on a single one of them to poison his whole system. They were removed, and the result was that he got up from his bed and is now at ninety-two years of age a monument of health and vigor. He goes daily to his office and manages a large business.

Dr. Vann, closing discussion: God speed the day when we shall have all mothers educated so that children's teeth will be looked after in infancy. We may tell a man not to go along a certain thoroughfare, but as surgeons we shall have to set his leg if he falls and breaks it. However, we are gradually educating people in the right direction. The reason that the edentulous old people have good health is because they chewed their food thoroughly when they had temporary teeth, and if you now give them an old hard crust of bread they will not swallow it before it is thoroughly softened in the saliva. Deprive a child of his teeth and you will see him strain and stretch his neck to get his food down.

TREATMENT OF PUNCTURED ROOT CANALS AND SPLIT ROOTS.

By DR. JOSEPH HEAD, D.D.S., Philadelphia.

The treatment of punctured root canals in the past has been fraught with the gravest difficulties. When the sterilizing of the canal extends through a series of sittings blood serum weeps in on the cotton dressing through the puncture during the interval between the treatments, thus rendering all efforts at antisepsis practically futile. Whenever a canal is punctured, whether through the end or through the side, mastication makes the gum tissue gradually enter the opening and in time partly fill the canal, leaving the neck of gum where it enters in a position to be constantly lacerated by the ragged edges of the puncture. This constant laceration causes a chronic inflammation which affects the health of the entire peridental membrane. When there is a large, undeveloped, unfilled apical foramen the conditions are similar.

The remedy for either of these conditions is obvious. The gum that has grown in the canal should be removed, the puncture sealed with a bland cover that will not project through the opening into the gum, and the canal sterilized and filled. Let us first discuss the means of restoring to a normal condition a canal that is punctured on the side. Cocain should be first inserted and the gum within the canal thoroughly reamed out so that the canal proper beyond the puncture is readily discoverable with the broach. Adrenalin is next to be added until the bleeding ceases, and the canal washed out with peroxid of hydrogen until effervescence stops. Care must, however, be taken to provide free vent for the effervescence of the peroxid or bad laceration of the periosteal tissue may occur. Then we are ready to construct the dam within the canal which shall stop up the puncture and prevent the gum from ever entering again. The canal should be dried thoroughly, and then a piece of inlay platinum foil,

longer than the canal, should be wrapped in a tight coil about an inch from the end of a smooth broach. The broach should be inserted into the canal past the puncture, and the coil of platinum guided down the broach past the opening into position. An instrument should now be placed against the edge of coil to keep it in position while the broach is being removed. We now have the coil of platinum within the canal, extending toward the apical foramen beyond the margins of the puncture. The next step is to uncoil the platinum and spread it out over the walls of the canal and the opening of the puncture. This can be easily accomplished by inserting a spiral broach to the bottom of the coil, and twisting backwards until the coil is partly untwisted. Then once more steadying the platinum to keep it in position the spiral broach is withdrawn, and after being wrapped with cotton is again pressed down into the coil, spreading the platinum firmly and evenly against the walls of the canal. While the broach is in the canal the portion of the platinum that extends above the mouth should be belled out in every direction and flattened down on the pulp-chamber floor. Keeping the broach still in position, oxyphosphate of zinc is flowed all over the floor of the pulp chamber, covering the platinum and surrounding the broach. When this is almost hard the broach with its cotton can be withdrawn, leaving a canal that has been restored to normal conditions, and which can be treated in any way that seems advisable.

Abnormally large foramina usually occur in the upper incisors where the tooth has been broken and the pulp destroyed before the dentin in the root has been normally developed. In cases of adults, where the death of the pulp occurred between the ages of seven and ten, the best method of treatment is to go through the alveolar process, expose the tip of the root, wash the canal thoroughly with peroxid of hydrogen, dry and fill with gutta-percha, and finally smooth off the tip of the root through the opening in the gum. This makes a clean, efficient, permanent operation. However, where a child of seven or eight is brought to us with the upper incisor broken and the pulp exposed the case is more complicated. In the first place the child will not consciously submit to the operation, and even if ether be given the tips of the roots are so far up under the nose that great cutting and much laceration would be necessary before they could be exposed and the canal filled by the method just described. Therefore, not being able to do the best we are com-

pelled to do the best we can. The great difficulty lies in not knowing just how long the canal really is, just where the foramen lies, and how large it is. This difficulty is the same whether the pulp has been dead for a year or is alive and has to be killed. If the canal has been empty for some time the constant force of mastication will drive the gum within the enlarged foramen, sometimes to the distance of one-eighth of an inch. If the pulp has to be destroyed it is difficult with such a large stump to tell just where the pulp within the canal ends and that outside begins. There are two ways of dealing with this problem. The first is to take an X-ray picture of the root, carefully measure the length on the skiagraph, and then fill up to the length shown, first making an application with cocain to allay sensibility. The second method is to cocainize the tip, and with a hooked broach reach up and catch the end of the foramen. Having thus obtained the measurement, fill up according to it, not according to the sensations of the patient. In either case it is wise to have an X-ray picture taken after the operation to see that the tip is perfectly filled.

Should a fistula have formed it must be treated and cured before the root is filled. In this case thorough syringing with peroxid, drying, and pushing of a small amount of iodoform or aristol paste into the gum beyond the foramen will tend to cause rapid healing and ensure temporarily at least the perfect filling of the tip. External injections into the fistula of carbolic, sulphuric, or trichloracetic acid will often be of great benefit, and heal up a bad tip sufficiently to keep the root safe until adult life is reached and a radical surgical operation can be done.

There is another way of treating punctured roots that is very simple and has much to recommend it. Curet the canal wall of all gum. Make the entire canal straight and conical, and while it is wet press in a plug of warmed high-fusing gutta-percha until it absolutely conforms to the shape of the canal. Remove the plug and wash it in alcohol, wash the canal thoroughly with peroxid of hydrogen and dry. Place a little iodoform or aristol paste in the tip, slightly moisten the sides of the gutta-percha plug with oil of cajeput, and press it firmly into the canal. The iodoform paste will fill the apical foramen, and the hard gutta-percha will seal the opening of the puncture without having the slightest tendency to protrude through into the pericementum. In cases where patients come

with the bottom and side of the canal drilled out the method just mentioned is the only feasible one. One such case occurs to me where acute inflammation and soreness were rapidly and permanently overcome by the insertion of such a gutta-percha plug.

The treatment of split roots varies according to the amount of the fracture. Where the piece broken is small it is much better removed and restored with amalgam. Later the edge of amalgam under the gum can be smoothed and polished and a band crown attached. Where a single root is split down the middle the two loose pieces should be firmly tied together around the neck with floss silk. The canal should then be washed thoroughly with peroxid, dried, soaked in nitrate of silver to prevent the cracked lines from decaying, the two separate sides of the canal dovetailed and undercut, and the whole filled solidly with amalgam. When the amalgam sets the floss silk can be removed, and the root then be capped with a band crown in the ordinary way.

In cases of small fracture of the root under the gum the amalgam restoration is better than running the band of the crown below the fracture, for the amalgam can be smoothed deep below the gum, while the edge of the band of a crown is practically sure to prove a source of laceration and infection. It is sufficiently hard to fit a band properly under the most favorable circumstances, and where the root has been fractured it is of the utmost importance that all irritating or infectious conditions should be prevented.

Where a firmly imbedded root of a molar has decayed away from the rest of the tooth it can be rejoined by drilling a hole through the crown in the line of the canal of the disconnected root. This root canal is then enlarged and cut with a screw thread, cement is placed in the canal, and a How German silver screw screwed into the canal through the hole in the crown of the tooth. Then the screw can be cemented firmly to the crown and cut off level with the grinding surface, and the decayed part of the root restored with amalgam. Of course it is better to sterilize and remove all decay before the screw is inserted. The opening in the crown which contains the screw can be filled with either gold or amalgam as seems most advisable.

Where one of the roots of a molar has necrosed it is better to cut off the entire crown, remove the necrosed root, and build up a smaller crown on the remaining root or roots. Where the lingual

root of an upper first molar has to be removed the two buccal roots make an excellent foundation for a crown that appears in every way from the outside of the mouth like the original tooth, only being narrower in its bucco-lingual diameter.

Where the crown of a lower molar has decayed away so much that little but the roots are left, and a sudden bite breaks them apart, screw threads should be cut in the canal of each and screws cemented into position. These screws should be wired firmly so as to bring the roots into correct position, the cavities in the necks of each should be dovetailed and undercut, and the whole restored with amalgam so as to make a perfectly smooth stump for the reception of a band crown. This amalgam can often be inserted soft on top of creamy cement, which is squeezed out as much as possible. Then the filling is finished with amalgam dried of its mercury in the usual manner. This is the method many good operators ordinarily use to insert amalgam.

When the two roots of a lower molar are split apart so far in the gum as to make it impracticable to draw them together, it is often advisable to use the crown as described by Dr. Goslee, that is, to band each separately, join the approximal edges of the band near the cutting edge, and place a single grinding surface over the two, thus getting the rigid support of both roots, and making it possible to cleanse the necks of each perfectly with toothpicks and antiseptic washes.

Discussion. *Dr. J. Y. Crawford,* Nashville: There is much more to be done with mutilated roots than the profession appreciates. We do not realize the tolerance of the gum structure to perform vicariously the functions of the original teeth. A full appreciation of this would enable us to see the value of surgical procedure in such cases. I prefer lead to platinum, and instead of lining the entire punctured root I would use just enough lead to cover the opening. I have a case in mind which illustrates the possibilities of treating punctured roots. The tooth was a central incisor with a loose crown in the mouth of a woman. I removed the crown and found serum inside. With an exploring instrument I detected increased hemorrhage and noted blood and serum oozing from both the distal and the mesial side of the root, and determined that the discharge did not come from the pulp canal. Funneling the tooth

with a barbed broach I entered the canal and found a root that had not been opened. The patient stated that the tooth had been filled and that the ordinary response to thermal changes was noted. That dentist pronounced the pulp diseased, opened it up from the mesial surface and went out under onto the distal aspect. The next dentist went out on the mesial side, and the third one cut it off and put on a crown. I opened up everything freely and placed a covering of lead over the two windows, cementing the discs in position. I then put on a crown, and when the patient called on me a few days ago she was still wearing it.

Dr. R. H. Hofheinz, Rochester, N. Y.: I would warn the younger men against the use of any cement against these punctures. I have had cases which have proven to me beyond question that gutta-percha is the only material which will not disintegrate if there is any possibility of secretions getting into the pulp canal. In one case after replantation, the root having been filled with gutta-percha, entire absorption of the root occurred, but the canal filling remained intact. In another case only a partial absorption took place, but the entire root canal was empty, which showed that all the cement had been dissolved in the canal. Another method is to burnish a thin platinum cap over these punctures and then fill the entire root with gutta-percha, so there is no chance of it getting through the puncture.

Dr. W. V-B. Ames, Chicago: I would say that my own experience and that of other people with punctures have shown that they can be very well sealed with oxyphosphate of copper, and after the usual trials with oxyphosphate of zinc and gutta-percha the copper was used with satisfactory results. After pressing back the tissues with dressing-seal gutta-percha a film of oxyphosphate of copper will bring the parts to a comfortable condition.

Dr. Wm. Crenshaw, Atlanta: This idea of closing the openings obviates difficulties which we have all met, and the suggestion is valuable. I never heard of a root of any kind in such a fix as the one Dr. Crawford mentions. The nearest approach to it which I recall was the experience of an Arkansas dentist, who told me that he once had a root with openings on four sides and one in the end, and that he did everything he ever heard of for it, but at length had to pull it out. He then whittled out a tooth from a piece of Mississippi River bottom scaly-bark hickory and fitted it into the

socket. It took root and became firm, but during the fourth year it bore a crop of scaly bark which almost choked the patient to death and he had to pull it out.

Dr. Head, closing discussion: As regards Dr. Crawford's suggestion, lead is bland and most acceptable to the tissues, but I should think it would be difficult to tell whether the edge ran off into the pericemental membrane or not, and with that idea I use the platinum tube to obviate any such possibilities.

SOMETHING OR OTHER ABOUT CHEMISTRY.

PAPER BY D. R. STUBBLEFIELD, D.D.S., NASHVILLE.

Our very industrious and truly zealous President thus paraphrased a request or demand upon us. Of course there could not be any real ambiguity as to his meaning, but his statement gave such a broad opportunity that the temptation could not be resisted. It is not often that a man has a chance to make a speech upon a topic so large that no matter what he says he cannot get off the subject. Another and a real reason for seizing such an opportunity or such a subject is that we do not wish anyone to suppose for a moment that this will be a serious attempt to present something new in connection with chemistry. This will be no discussion abounding in chemical formulæ and technicalities, the kind that only the author understands and only a corporal's guard beside him appreciates enough to listen to clear through to the end. We have too much respect for the science of chemistry to masquerade as one of her true votaries. What we shall undertake is to give some plain convictions that grew up in our mind during the seventeen years of efforts to teach the merest rudimentary principles that underlie the science of chemistry.

We are convinced that students accept chemistry as the little boy takes castor oil—one hand of his mother on his nose and the other at the nape of his neck, while the assistant takes advantage of the first opportunity to get well into his mouth. There is no love lost between dental students and chemistry. The student who loves chemistry and finds some pleasure in its study is, like the traditional hen's tooth, "skace." Why is this? There must be some cause for such an incontestable effect as this. All through the years we have personally suffered from this effect and have wondered what was the cause behind it. This is the first coherent effort to fathom the mystery. In our opinion the whole trouble lies

in the fact that the course in chemistry in our dental schools has been too superficial and too brief to produce more than a puzzling partial knowledge, which has long been denominated a dangerous thing. Chemistry is known to be an experimental science, not to be worked out by the reason, but to be known only by absolute experiment. Experiments take time and repeated efforts, and anything like a get-knowledge-quick scheme is an unheard-of, not to say unthought-of, idea in this world of reactionary affinities where proof is the only passport. Such is the intensely practical nature of our branch of the healing art that until now the schools have been unable to set aside enough time to do this work properly.

The result has been upon the whole a hollow mockery, depending for its greater or less grotesqueness upon the individual judgment exhibited by each teacher. If the instructor recognized the absolute futility of trying to make enough headway into the science to engender a love for its real worth, and satisfied himself in trying to make familiar the simplest conception of its A B C's, he most likely hit what he aimed at. Familiar with such fundamentals the students thought themselves informed in chemistry, and gained a self-poise that goes far in the effect produced by any man upon his professional brothers and the public at large. On the other hand, if the teacher seriously set to work to teach chemistry to the class his task was too large for his time limit, and the food was too rich for the weak digestion of the minds before him. He rarely succeeded in opening the eyes of a single student to the beauties of his branch, and he and his remained a thorn in the flesh to the generations of students as they ran.

What the practical outcome has been some of you are doubtless well aware, and are willing to testify that better results might have been more desirable to the profession. You must admit, if you have thought deeply regarding it, that the limitations from one cause and another which have constantly hampered this work make it plain that the doing of even so much was quite an achievement. It must be taken as an earnest of what might have been done.

This brings up the question that has been frequently asked: What is the use of my studying chemistry? Is the game worth the candle? Is a half-loaf better than no bread? We are one of those who believe that nothing is too sacred to be investigated and that the truth is able to withstand the most searching scrutiny. Have

the efforts of the past repaid the investment of labor in cultural value? What do you think? The question has two sides and you certainly believe one or the other. To bring the question before you, as the parliamentarians are fond of saying, we wish to say that we believe all honest effort has been repaid by the results attained. From the standpoint of chemistry, pure and simple, we do not believe much has been done, but the general cultural uplift and the practical worth of the facts obtained from chemical philosophy have been worth more than the labor expended. In this we are estimating the result on its lowest level, yet we believe the information incidentally acquired has enriched the minds of students, making them more enlightened citizens than they would have been without it, and whatever elevates the man tends to improve the professional man, and he is always expected to be a little better informed than the average member of the community. Again, it is difficult, if not impossible, to tell just what impetus is given to the mind by each individual study, much as it is impossible to know what special article of food gave the energy to mind or muscle in a general dietary, but the aggregate effect is there and that is what we are after.

Besides this intangible and almost spiritual effect which cultural studies have upon the mind, there is a distinct addition to practical knowledge in the many plain, everyday common facts that may be obtained. It is something to know, for instance, that this complex universe of ours may be simplified into a few forms of elemental matter set forth in the table of elements, and a firm grasp of that fact renders us almost indifferent to the suggestion that right now the elements of the past may soon be proved to be compounds. We have something to stand on, clearly defined in our comprehension, and we confidently await any results of later experiment, willing to accept additions or subtractions with an even mind.

Again, the chapter on water alone contains enough compensation to pay for more time and labor than the average man has bestowed upon this study. We believe it is worth much to know that water, the only exception to the law that all matter expands when heated, gives more to the world than any other one compound. It used to be said that the general advancement and progressiveness of any country were measured by the amount of sulphuric acid it consumed in its affairs, but we wish to call your attention to the fact that the

culture and enlightenment of any people are to be measured in this day and time by the intelligent use and quantity of water consumed. Its great abundance outside of us, covering three-quarters of the earth's surface, is paralleled by its abundance within the animal and vegetable worlds. Its importance to both cannot be overestimated, for its presence is indispensable. That exceptional property of contracting instead of expanding from 32° to 39 1-5° F. makes the difference between inhabitability and uninhabitability of this world of ours. Ice floats because it is one-tenth expanded, but if it were not for the fact cited above freezing would go to the bottom of all bodies of water and Summer suns would not be any more able to melt them than they are the century-old glaciers that fill the valleys of some parts of the world. That would bring death-dealing dreariness.

But we must desist. This paper would go to an extent incompatible with time and place to tell the catalogue of excellent facts worth knowing which are to be derived only from a study of chemistry. These examples illustrate the statement that many practical truths may be obtained from chemistry which will make its study worth while to any man, especially to the professional man. It seems like trying to prove the truth of an axiom to attempt to prove the importance of a study of chemistry in making the best preparation for our profession, when the usual occupation of the dentist is repairing the ravages of a chemical agent upon the teeth. Therefore we conclude with a repetition of the plea for more time and more work in chemistry to be demanded on the part of those who make the colleges and the rank and file of the profession all over our great land.

DISCUSSION. *Dr. W. V-B. Ames,* Chicago: It has been a matter of regret to me to realize that chemistry is usually placed before dental students in such an unattractive manner, for if they do not become interested in the subject while at school they never will. The study of chemistry is very apt to appear to the dental student as the study of Greek and Latin does to the average youth. Unfortunately they came to be called "dead languages," and boys would study them as dead languages and with a very meager interest. If the youths of this land could be impressed with the usefulness of the so-called dead languages to them in all walks of life, and espe-

cially in social intercourse and literary pursuits, they would take up the study of them with just as much vim as they do other subjects. In the same way, if the study of chemistry could be placed before the dental student in the light of being of much use to him in practice, as it necessarily must be, he would certainly take a greater interest and it would not be such a dead subject to him. It is a matter of regret to me that so often chemistry is taught by a man who knows nothing whatever of dentistry, and who consequently does not make the subject live and interesting to the students by giving practical illustrations, showing where each item of chemical study may be applied by the practicing dentist.

Dr. R. H. Jones, Winston, N. C.: The ideas set forth by Dr. Stubblefield are worthy of our serious consideration, for as dentists we do not realize the great importance of a proper knowledge of chemistry if a man is to be a successful practitioner.

PREPARATION, TREATMENT AND FILLING OF THE ROOTS OF TEETH.

PAPER BY L. G. NOEL, D.D.S., NASHVILLE.

Wishing to avoid as much as possible the utterance of trite wisdom on the topics I have chosen, and to treat them with the brevity consistent with clearness, I shall omit much detail, remembering that my audience is made up of skilled operators, who are capable of grasping a mere suggestion. I must at the beginning crave the indulgence of those who can tolerate only new and original thought, and remind them of the extreme rarity of fresh ideas on any old subject. My subject being as old as operative dentistry, I must of necessity traverse much familiar ground in the hope of either calling your attention to things often overlooked, or of bringing you to see familiar things in a better light by approaching them from another point of view.

I assume that I may lay down as an established rule that will apply to all classes of teeth in the human denture that the pulp-chambers should by preference be opened from the occlusal, morsal, or cutting surface, so that instruments may be directed into the roots along the line of the axis of the tooth. This rule, like many others, will be found subject to modification under varying circumstances, but these will not affect the cardinal principle that we must obtain direct and easy access to all the roots from the pulp cavity. This will best be accomplished by opening the pulp cavity as above described whenever this means of approach may be deemed judicious.

Having penetrated the pulp-chamber from the morsal aspect or roof, care must be taken not to mar or alter the shape of this cavity at any other point. The roof may be removed and the pulp-chamber laid open by means of pointed-fissure burs or bud-shaped burs. Some manufacturers are turning out flame-shapes in cross-cut instruments that are admirable for this purpose. The alteration of the

pulp-cavity at its floor or alveolar aspect should be avoided as much as possible in molars and bicuspids, because injudicious cutting here may result only in opening false pits for the catching or misguidance of the instrument.

Whenever it is possible to find entrance into the pulp canals for the broach these may be sufficiently enlarged, cleansed and excavated by patient or continued broaching. I need not weary you by repeating the old caution against reaming with engine burs. You will recall many mishaps of your own and many that you have seen from other hands as the result of this practice. On opening pulp canals it will be a good plan to make haste slowly. The flexible, twisted reamers, with short, corrugated handles to be turned in the fingers, may be employed after the canals have been opened by the broach and the contents removed. These will be found especially useful in opening the flattened canals in the anterior roots of the lower molars.

In opening the molar teeth frequent syringing should be done to remove debris and prevent the clogging and occluding of canals. This should also be done in reaming, and the broach should be used frequently to clear the way. The syringe is not used enough in operative dentistry, and thus debris is often left sticking around the cavities because we are too sparing in the use of water. Abundant irrigation with warm water heavily charged with hydrogen peroxid and formalin will be found useful, especially in septic cases. The fact of having the rubber dam in place should not prevent this.

Pulpless teeth may be divided into two classes—septic and non-septic. Treatment: Having opened the pulp canal (or canals) and removed the contents, the treatment will vary according to the class under which the case in hand may be catalogued. The septic class will comprise all those teeth in which death of the pulp has resulted from the penetration of caries and inflammation caused by the invasion of microorganisms. It will embrace also all cases where pulps die under fillings or crowns, and where the putrescent contents are left in pulp chambers and canals, and all cases where portions of the pulp tissue are left as the result of imperfect extirpation, and fillings are introduced without the necessary precautions of burning out and sterilizing by the use of proper agents. The non-septic cases will be those only from which living pulps have recently been removed.

Treatment of the septic cases: After thorough opening and removal of contents, in which case care must be taken not to force septic matter through the apical foramen, we should give the patient a period of rest to allow the pericemental inflammation to subside. In some instances this will mean days and in others weeks. Many of these more obstinate cases will present the peculiarity of a manifestation of pain always upon the passage of a broach into the canal, and frequently showing blood or bloody pus upon its withdrawal. Sometimes this bloody discharge wells up into the canal after the removal of the broach. These cases will not tolerate tight cotton dressings while this condition lasts, but must be loosely dressed, so that they may drain. It is my practice to syringe out with equal parts of formalin and hydrogen peroxid, diluted with warm water until about blood temperature. In these washings care must be taken not to force the fluid into the roots. Where the syringe is not well borne, I wipe out with this fluid with cotton on the broach. I have found oil of eucalyptus the blandest and least irritating dressing to leave in the canal. This may be supplemented, as soon as fairly tight dressing can be borne, by powdered orthoform or aristol. This may be left in the canal until the tooth will bear slight percussion without pain.

It is safer in these cases not to risk a permanent filling until a temporary tight stopping has been tried. This may be a thread of silk floss or a wisp of cotton saturated with oil of eucalyptus or oil of cinnamon to stop the root canals and the pulp chamber, the remainder of the cavity being filled with gutta-percha. If this stopping is tolerated for a fortnight, and all pericemental inflammation has subsided, as evidenced by the absence of pain upon percussion, we may safely introduce the permanent filling.

Treatment of non-septic canals: These usually require little or no treatment beyond checking the hemorrhage and the flow of serum into the canal. The non-septic are those from which the healthy pulp has just been removed, and are the only roots that may be safely treated by immediate filling. After extirpation of the pulp creosote upon a broach with cotton will relieve the sensitiveness and tend to check the flow of blood. This may be followed by a thorough cauterization with a root-canal drier—the best means of checking the flow of blood or serum. We are now ready for the permanent filling.

I approach the description of my method of filling root canals with timidity, because I am not satisfied with it. I feel that it is not perfect; that it needs to be improved; that it is not applicable to all cases, and that in some instances it is difficult to perform. It is not new, nor is it original, yet it bears the stamp of approval of the best operators in the profession, notwithstanding my feeling that it is not perfect and must some day be supplanted by another and better method. The good results I have seen give me faith in it, and the hope that it may be at least the first step toward the better and more perfect operation.

The stability and enduring nature of gutta-percha, together with its non-irritating property, its non-conductivity of heat and electricity, and its easy solubility and plasticity, all commend it to us as a suitable material for the filling of root canals. The closure of the apex of a root is conceded to be the sine qua non to success in root filling. I believe this to be as easy of accomplishment with gutta-percha as with any material that has yet been suggested, and I know from experience that it excites no irritation nor inflammation if a little should be forced through into the track of an old sinus. In talking with Dr. Black once on this subject I asked him the question: "How can gutta-percha be placed in a root canal that cannot be dried?" His answer has influenced all my practice in this operation from that day to this. He said: "First displace the water with oil of eucalyptus, which you can easily do by introducing the oil on a cotton-wound broach; then, since the oil of eucalyptus is a solvent for gutta-percha, you may introduce chloro-percha into this menstruum without difficulty." Thus I got an idea that has been helpful to me, and upon which I trust that I have builded well. My method may be briefly stated as follows:

Dryness is a condition to be desired, and when practicable should be obtained by application of the rubber dam, etc. Having removed all moisture, the canal should be filled with eucalyptus oil, as previously suggested. For making antiseptic chloro-percha, I keep ever ready an ounce bottle of chloroform in which have been dissolved forty grains of aristol, always accessible likewise is a sheet of red base-plate gutta-percha. Pouring a half-teaspoonful of the aristol mixture upon this sheet, it is quickly spatulated into a syrupy consistency and is then ready to be introduced into the canal. The solvent is improved by adding eucalyptus oil to the chloroform in

order to prevent the too-rapid evaporation and drying of the gutta-percha. It may be compounded thus:

Chloroform,
Eucalyptus, aa SS fl ℥
Aristol, gr. 40
M.

The canal having previously been wetted with the oil, the chloro-percha is led by capillary attraction into the finest parts. A gutta-percha point is introduced as a central core, and pressed as tight as possible, when the operation of root-filling may be said to be complete. The introduction of gutta-percha points is not as easy as the novice would infer from a description of the method. It will become easier when we find a method of making the gutta-percha points stiff, yet flexible. As we get them from the manufacturers they have a most provoking tendency to double upon themselves and refuse to find their way into the canal. This difficulty may be overcome to a certain extent by the use of a suitable flexible smooth broach for catching the gutta-percha, stopping at or near its point, and thus supported it may be carried into the canal. Such instruments I make from old broaches after the barbs become dulled or broken off. They must be highly polished and sharp as fine needles at their points. After the point is carried well up an old serrated flexible root-canal plugger should be thrust in at the orifice to hold the mass in the canal while the broach is being withdrawn. This latter instrument will be found useful for packing the whole mass tightly in the canal. It should be used cold, for it penetrates the mass when heated and hence may bring all away when withdrawn.

Discussion. *Dr. R. H. Jones,* Winston, N. C.: I was especially impressed with the method of treating the canal when it is in such a condition that we are afraid to cut into it for fear of future trouble, and I shall give the eucalyptus oil a good trial. Many of the points set forth by Dr. Noel will be of great advantage to us in the treatment of these cases.

Dr. J. Hall Moore, Richmond, Va.: For nearly fifteen years I have been in the habit of filling root canals with tin or lead. You can buy the little points from the dental depots, but most of them are not large enough, so I have the lead or tin drawn out at the depot or at a jeweler's into thin wire of different sizes. You can make the points yourself, if you like, with a draw plate, drawing

the material into thin wire of different sizes. Then cut this wire into short pieces, and dress them down with a coarse file to a size a little larger than the canal. I force the point into the canal with a blunt-pointed plugger, and in large canals sometimes first dip the points into thin cement. Of course, I am very careful about putting any filling into a canal until sure that it is in proper condition, and during fifteen years I have never had trouble by this method. It not only saves time, but gives a perfect root filling.

THE FOUR YEARS' COURSE—IS IT NECESSARY?

PAPER BY HENRY F. R. SNYDER, D.D.S., BALTIMORE.

While in this paper I do not presume to solve the problem of just what the scope of a thorough dental education should be, I nevertheless have some rather positive views as to the inadvisability of extending the dental course to cover a period of four years so long as dentistry is to be considered separate from and independent of the general medical profession. The thoughtful unbiased observer who has critically watched the wonderful evolution of dentistry during the last century now has the fact staring him in the face that the time is not far off when our beloved branch of learning must return unto the fold of the great general medical science as one of her greatest and most comprehensive specialties.

Already a large number of our best men are forsaking the laboratory to a great extent because of their inclination to a deeper and broader study of oral pathology and hygiene. These men are making remarkable progress in their knowledge of the histology of the mouth and jaws. They know the physiology of digestion well, and the slightest derangement of this preeminently important function they frequently detect and diagnose with ease because of their superior scrutiny of the oral tissues. They show a very creditable familiarity with materia medica and successfully apply drugs in their medical treatment of oral and dental disorders. They are self-possessed and efficient anesthetizers, for they understand the vital organs in their deranged as well as normal condition.

Here and there we even hear of a zealous member of this class of modern dentists going beyond tooth extraction as the limit of his surgical skill and performing with distinguished success some delicate operation upon a necrosed maxilla, a hypertrophied alveolar ridge, an infected antrum or a cleft palate. However, in spite of all his medical and surgical skill he usually does not get from his

patient an appreciation of his services commensurate with his ability. He has not the professional standing with the laity generally that he deserves because they cannot view him as a real doctor—he is only a dentist. To strengthen this erroneous impression the dentist, no matter how capable a stomatologist he may be, has nowhere a legal standing as a medical practitioner.

The four years' course, which really aims at a more complete divorcement of dentistry from medicine, by its patchwork medical instruction can only obstruct the progress of sound scientific research into stomatology. While the average physician displays a most deplorable disregard for a scientific consideration of oral conditions, the pursuit of investigation into diseased conditions of the mouth and teeth can be intelligently furthered only in its relation to a thorough knowledge of the whole body in health and disease. Therefore, if more instruction is needed to fit a dental student for the requirements of advancing science upon his skill, let him enter upon a full medical course at once and develop his dental and oral knowledge on a common footing with other medical specialists—only after a thorough education in general medicine.

But we have with us another class of able men who, in contradistinction to the above-mentioned men, largely cast aside the more scientific study of dentistry for a furtherance of artistic dental mechanics. These skillful artists can make artificial substitutes for the natural dental organs and supply oral defects, in the way of crowns, bridges, dentures, obturators, etc., which defy the criticisms of the most scrupulous as to their usefulness and close approach to the real. These skilled mechanics should not be considered doctors of dental surgery or doctors of anything else.

To sum up, a dentist should be a thoroughly educated physician and should practice his specialty on an equal professional footing, with the same opportunities for scientific study and research as are usually accorded other medical practitioners. A dental mechanic should be allowed, unhampered by college examinations and state board laws, to pursue his vocation of supplying to oral specialists, and to them only, such artificial contrivances and mechanical appliances as they may deem advisable to have made for their patients.

This solution of the problem of what dentistry should be will not be immediately accepted. Therefore, until the two very different elements of our present dental profession can be brought to place

themselves in the relative spheres they should occupy, let us patiently continue with the three years course of study. The advance which ought to be made in the dental curriculum at this time should be in the quality of instruction rather than in the length of the student's residence at the dental college.

DISCUSSION. *Dr. J. P. Gray,* Nashville: I cannot let a paper pass without some criticism when it takes the stand that Dr. Snyder's does. It seems to me fallacious that some men should be called dental surgeons and others should not. Work in the medical branches of the profession and in the mechanical—in fact the whole of it is mechanical, operative as well as prosthetic—must go hand in hand. I bitterly fought the four year course, but since it has been started it should be given a fair trial. Members of the profession can help the colleges by encouraging the right sort of men to study dentistry and by urging the examining boards not to pass men who are undergraduates.

Dr. J. H. Crossland, Montgomery, Ala.: We have made some progress, although nothing like what we should have made, but by all means let us keep what we have gained if we never gain any more. Let us take no backward step. We have enough ignoramuses in the profession now—don't give us any more. There are entirely too many men in dentistry to-day who degrade it and who should never have been admitted to it. The colleges must be induced by some means to exclude those whose souls know nothing of the artistic or of the high and noble things of life. If a man has some education in ethics before leaving home, and receives some more after entering college—if he has an understanding of the eternal fitness of things—he will honor and not disgrace his profession. In my opinion the four year man will be just as good a dentist as the one who has studied three years or even two. It may be narrowing to study four years, but I must confess that I cannot see it.

Dr. Gray: Why don't you send us better men?

Dr. Crossland: We would if you would only send back some of the ignoramuses that come to you instead of graduating them. They are the fellows that are killing dentistry to-day. We want men who have some foundation to start on. As Emerson says, "No man can learn that which he has not preparation for learning." If there is no prepared soil how can we sow the seeds of learning, of progress and of ethics? The destiny of dentistry to-day is in the hands of

the colleges and the examining boards, and if the schools do not select instead of accepting these students dentistry must retrograde. The time has come when even business men are turning away from mercantile pursuits and broadening their minds. The man who enters a community with splendid attainments in dentistry but with no general culture cannot impress the public with the idea that dentistry is a learned profession.

Dr. J. Y. Crawford, Nashville: I don't think dental students should be better educated than anyone else, but I think they should have quite as much culture. I have insisted upon great competence, the same to be determined by some authoritative body, either the state boards or the faculties, and my idea has been to put restrictions upon institutions of learning so that they should be the highest tribunals to which a man's ability might be referred. I have also insisted that the right to continue in practice should depend not only upon technical requirements, but on a consistent compliance with ethical conduct. This is an important point which has not sufficiently engaged our attention, and we should take some steps by which men who are incompetent could be debarred from practice. My idea was to have only three years and to magnify the teaching of our dental schools along fundamental branches, making more favorable arrangements with the other institutions whereby the dental student could perfect his minor branches. They sought to minimize the importance of the fundamental branches and to give more attention to technical work, so the colleges have gone to the four years course. It would be a retrograde movement to shorten the length of term because, first, it takes a man longer to qualify himself mentally, morally and physically for the successful practice of dental surgery than for any other profession, and second, the dentist encounters greater difficulties to intellectual progress after he begins practice because the elements of manual labor enters into it so largely that he has not time to read and study. The average practitioner has to work day and night to earn $1,500 a year, and from the first the dentist enters the tinpail brigade and is a laboring man.

MINUTES OF THE MEETING.

The sixth annual meeting of the Southern Branch of the National Dental Association was held at Columbian University, Washington, D. C., February 23-26, 1904.

The first session was called to order by the President, Dr. Geo. S. Vann, at 10 o'clock, and was opened with prayer by Rev. Dr. McKim of Washington.

Commissioner H. F. B. McFarland delivered the address of welcome on behalf of the city as follows:

Mr. President, Members of the Southern Branch of the National Dental Association, Ladies and Gentlemen:—I feel that it is unnecessary to welcome you to the capital city, as this is your capital quite as much as it is ours. We are each one, however, personally glad to see you and welcome you when you come to visit your capital. We are all glad to have you with us and hope you will come to Washington every year, and we hope that every time you come you will find as pleasant work to do as awaits you this time. While you are with us, sharing the joys and pleasures of the sunny South, we hope you will take the time to see all that you can, not only of the beautiful city and public buildings, but also of the new Washington which is spreading all over the surrounding hills and, as we think, is becoming more attractive every year. We feel sure that you will be interested in this development of the capital city as well as we who live here, and that you will show your interest in this development by using your influence so far as you can to advance its interests with the senators and representatives who are our legislative body and through whom must come our laws, and through whom must come our appropriations to make these different improvements. You know the District of Columbia is different from any other section of the country. We are a state for some purposes, a territory for some, and a municipality for others. We have no elective franchise for any purpose, and most of us are glad we have not, because we are spared many troubles. We are all, however, a unit in one respect, and that is in the upbuilding and beautifying of our national capital, and we are sure that you feel the same as we do and that after your visit you will be more enthusiastic than ever in using your endeavors to advance the interests of the city.

If you go down to Alexandria while here, I hope you will go into the

public library building and see the portrait of Washington which hangs on those walls, and which I think is the most beautiful and natural likeness we have of him. One thing will interest you especially as dentists, and that is the characteristic appearance of his mouth. This picture was taken during the last five years of his life, when the present advantages of dental science were not enjoyed. If you should visit this historic old place of Alexandria, I am sure you will feel a higher spirit of patriotism than ever before.

Again, Mr. President, ladies and gentlemen, we welcome you, one and all, to our beautiful city.

Dr. W. G. Foster, president of the Maryland State Dental Association, on behalf of the Society, very gracefully extended welcome and fraternal greeting as follows:

Gentlemen:—In extending to you a most cordial and hearty welcome, on behalf of the Association over which I have the honor to preside, I but echo the sentiments of this body. We feel highly honored in having so many distinguished men, not only distinguished in the profession which they have chosen, but honored for their good deeds in their bailiwicks, good, genial companions in fellowship, coworkers in the advancement of our profession, self-sacrificing for the benefit of the majority. Possessing these pronounced qualities singly and collectively, is it to be wondered that we feel a glow of pride and satisfaction in having you as our guests, knowing and feeling assured we will reap benefit from the intercourse, pleasure from the commingling and interchange of ideas, and that a closer tie will be woven and appreciation of each other which ofttimes leads to lifelong friendships?

There are present men of mature years, who have contributed their mite to our beloved profession, and are earnest in their endeavors for its further advancement. There are those with us just entering into their life work, who are enthused with the chimerical anticipation that at some time they will be the discoverers of the tooth germ, and instead of transplantations and replantations the germ will be planted in the gum as a tree in the soil and will spring up and be a "thing of beauty and a joy forever."

The dental profession, as a liberal profession, welcomes all advanced theories and will lend aid and encouragement to those who sacrifice their time to attain this end. It is useless in these rapidly advancing times to predict the future of our profession, but, judging by past events, we have the encouragement to feel assured that the future of our profession will be of the highest standard, and with this end in view it is the duty of all to use their energies to push and keep pushing on such lines as may be deemed best from their individual standpoint.

The calamity which has befallen our beloved city of Baltimore has somewhat diminished the number who otherwise would have been in attendance to welcome you. Their duties are at home, our duties are here, and again, in behalf of those absent and those present, you are accorded a most cordial welcome.

Dr. W. D. Monroe, president of the District of Columbia Dental Society, on its behalf felicitously extended hospitality and welcome as follows:

Mr. President of the Southern Branch of the National Dental Association, Mr. President of the Maryland State Dental Association, and professional brethren:—It affords me great pleasure to welcome you to our city. Again we are assembled to do honor to our loved profession; to perpetuate the usefulness of our Associations, the foundation of which was laid broad and deep by men who saw the wisdom of such conventions. We meet to broaden our conception that we may be better able to administer to the alleviation of suffering humanity. No man can afford to neglect this means of broadening and extending his education. These meetings should be of unlimited mutual benefit to all who may come within their influence.

Look into any profession you may, and you will find the successful men of to-day are those who touch elbows and come into contact with their professional brethren. Our profession at present is full of hope, blue sky and sunshine; and we, who are members of the District of Columbia Dental Society, gladly welcome every one of you. We should be able to combine strong individual forces or societies that would advance onward and upward until our profession is beyond and in advance of them all. No other profession has ever made the progress of ours. Why, then, be content? We need to cultivate our intellectual faculties as well as train our hands. Look around, anywhere in your native towns, and do you find progressive, up-to-date men who do not become interested in dental societies? The secret of success lies in improving to the best advantage such opportunities as lie around us. Another point not to be forgotten is the wonderful development of the moral faculties found in coming together in these meetings.

We cannot all be at the very top round of the ladder, but we can keep climbing. We cannot all write scientific papers, nor can we all be speech-makers, but we all can do something. The time has been when general information was impossible, and perhaps almost useless; but it is so no longer. The world is bound to find out what there is in a man and what he is capable of doing, consequently the young man should develop himself; if not for business interests, he certainly owes it to himself socially. Too often the professional man among us forgets the importance of man as man, but his worth and usefulness are surely but silently spreading. That the world was made for all, and not for a few, we sometimes seem to forget. We should welcome every opportunity that affords us a means of development. Had the original thirteen states of the Union been contented to stop where they were, what would have become of them to-day? Do you think we would have any show for a Panama canal? No; we must keep pushing ahead and take advantage of every opportunity presented to us.

How long since the medical profession has recognized us as professional men? Would we have ever gained any recognition had it not been for our societies and associations? My sentiments are expressed by our late poli-

tician—"Stand pat, boys." Give us more dental societies. Get every ethical man interested and let us meet more frequently, and we will welcome you every time.

Response on behalf of the Association was made by Dr. J. P. Gray of Nashville as follows:

Mr. President, Hon. Commissioner, President of the Maryland State Dental Association, President of the District of Columbia Dental Society, Ladies and Gentlemen:—This is rather an unfair advantage to take of me, as Dr. Grant of Louisville was to deliver this address, and he failed to come and also failed to send his speech that he has been preparing for some weeks, and therefore I have no address for you, but I can say this, Mr. President, Mr. Commissioner, and gentlemen of the District of Columbia and Maryland Societies, we thank you for this hearty welcome to Washington. This is our own city; the Commissioner told us it was our own, and I want to say to the gentlemen from the South, North, East and West, you can go over to your treasury and pass through it if you wish, but that is all that you can get. I am glad, Mr. President, that the Commissioner has turned the town over to us and will protect us while here. Some of our friends from Atlanta, Raleigh and Richmond will probably need the protection of the city, and I will take the liberty now of calling upon you, Mr. Commissioner, to lend us a detail of the municipal police to care for these gentlemen. They are all young men, not over sixty or seventy, and some younger, and will need protection. The guests from Chicago, New York and Philadelphia will possibly not need protection, because they are shrewd men and accustomed to dodging things, but we young men of the South, who do not have the opportunity of coming here very often, we need someone to guide us and show us around. And, besides this, there are some men here from Missouri—they need to be shown things. I truly hope that every member of the Southern Branch of the National Dental Association and our guests will have a good time. It is our city, and it is our capital, and if you will look around you will gain a great deal of information. Through the Commissioner, I want to extend to the Congress and Senate an invitation to visit this meeting, and they will imbibe some oratory that will do them good. We are all orators, and a few of us are parliamentarians, and I am sure it would do them good to attend these meetings. We all come here to have a good time and a profitable meeting. No one can come to Washington and enjoy the hospitality of our capital and not be benefited by the patriotic influences thrown around us here. I thank you again, gentlemen, for your kind welcome to us.

Vice-president Dr. C. L. Alexander then took the chair, and President Vann read the annual address. On motion, this address was referred to a committee consisting of Drs. J. Y. Crawford, B. Holly Smith and Wm. Crenshaw for consideration.

Dr. A. R. Melendy, Chairman of the Executive Committee, an-

nounced that the Committee had no formal report to offer, but was ready to receive and pass upon credentials and applications for membership.

On motion, reading of the minutes of the last meeting was dispensed with, the same having been published.

On motion, the Society adjourned until 2:30 p. m.

FIRST DAY—AFTERNOON SESSION.

At 2:30 p. m. the meeting was called to order.

On motion by Dr. A. R. Melendy, seconded by Dr. J. A. Hall, the courtesies of the floor were extended to the members of the District of Columbia Dental Society, Maryland State Dental Society, and the National Dental Association.

The President asked for the report of the Committee on Oral Hygiene. Dr. J. E. Chace, Chairman of this Committee, stated that papers on that subject would be presented by Dr. M. L. Rhein of New York, Dr. L. C. Taylor of Connecticut, and Dr. Bessie B. Bennett of Maryland. He then read his report.

On motion, the report was received and declared open for discussion. Dr. Chace suggested that the other papers on the subject be heard before beginning the discussion, and Miss Bessie B. Bennett read her paper, entitled "Oral Sepsis in Childhood."

At the suggestion of Dr. B. Holly Smith, Dr. E. P. Beadles moved that the invitation of Dr. Wms. Donnally to a reception at his house that evening be accepted by the Association. Carried.

A short recess was taken to facilitate the paying of dues.

Dr. L. C. Taylor then read his paper on "A Few Gentle Hints."

On motion of Dr. Chace, the paper was received and declared open for discussion, but discussion was postponed until Dr. Rhein read his.

Dr. M. L. Rhein then read his paper, entitled "Limitation of Dental Prophylaxis."

On motion of Dr. Chace, the two papers were announced open for discussion.

After closing the discussions, the resignation of Dr. H. A. Parr of New York was presented and accepted.

On motion, the meeting adjourned.

SECOND DAY—MORNING SESSION.

The meeting was called to order at 9 a. m.

There was no report from the Executive Committee.

Dr. R. H. Jones, for the Committee on Pathology, Materia Medica and Therapeutics, reported a paper by Dr. N. N. Vann. Dr. Vann read a paper entitled, "Preservation of Deciduous Molars and Cuspids." The paper was received and declared open for discussion.

Dr. J. H. London announced that the President of the United States would receive the members and visitors of the Southern Branch of the National Dental Association at half past two, and the local dentists, together with the Maryland State Dental Society, would tender a banquet to the members and visitors of the Southern Branch.

Dr. J. N. Crouse then made a few remarks concerning the reorganization of the Dental Protective Association, and, on motion, the following resolution by the National Dental Association was endorsed:

Whereas, In view of the fact that some definite action must be taken by the profession at large in the United States to preserve the present Dental Protective Association, or organize some association which will be on a more permanent basis and have interests which this Association does not possess; be it

Resolved, That Dr. J. N. Crouse, chairman of the Dental Protective Association, be authorized and instructed to take such steps as are necessary in his judgment, and with the counsel of such of the profession as he may associate with him in this movement, to organize an association which will meet the requirements necessary to make it permanent, and, as far as possible, unite all the profession in this one organization, on the lines outlined by him in this meeting, and with such other conditions as seem wise to adopt after due consideration. In so instructing the chairman of the Dental Protective Association, we do so with the full belief that, with his long experience in this work, he is more competent than any other man in the profession to make such an organization as is desirable and absolutely important to our existence without being annoyed from time to time with impositions and abuses which such an Association prevents. In offering this resolution we do so with the full confidence and belief that everything which may be undertaken and managed by him will be done honestly and for the best interests of all concerned.

Dr. W. G. Foster presented a petition to be presented to Congress, requesting that body to present a medal to Dr. Wilson of Savannah

for his gallantry in saving the life of Dr. J. J. Sarazzin of New Orleans, and asked that the members endorse it. He asked that Dr. B. Holly Smith make a statement in connection with it. Dr. Smith then spoke briefly on the subject, and moved that the Association petition Congress to award such a medal to Dr. Wilson as is ordinarily given. Adopted.

Dr. Richard Grady then made a few remarks, as follows: "Dr. J. P. Corley has sent me some resolutions in connection with the Nautical Preparatory School that I wish to read. It may not be the opinion of all that this nautical preparatory school will soon be in existence, but if it should be there will be two hundred and fifty young men taken aboard and instructed as naval cadets, and what Dr. Corley has in view is that there should be some recognition of dentistry. I will therefore without further talk read the resolution:

"The Nautical Preparatory School provides a course of instruction for young boys on board a modern ship. It has, in addition to the literary, scientific and athletic features of an ordinary preparatory school, an itinerary of four years, which includes every navigable port in the world; also land excursions to points of special interest in all important countries. Besides a personal and practical study of the different countries, governments and peoples, special attention will be given to international commerce. The school is under the management of an admiral of the United States Navy, and will observe regular naval discipline. The student body will be composed of two hundred and fifty cadets, from thirteen to eighteen years of age.

"This is the crucial period in the history of the dental armature, it being not only more susceptible to carious invasion, but the ravages of decay are more rapid and disastrous. Statistics, as well as clinical experience, prove that the masticating apparatus is usually crippled before its possessor is twenty years of age, and if a tooth be lost facial contour and expression are markedly modified. If mastication be impaired digestion shares the same fate, and herein lies the foundation of a majority of the ills to which mankind is heir.

"*Therefore, be it resolved*, 1st, That the Southern Branch of the National Dental Association recommend that the managers of the Nautical Preparatory School add to their medical staff a dental surgeon, whose duty it shall be, not only to attend to the dental needs of the student body, but also, by regular instructions and with the assistance of the authorities, to establish a dental regimen and system of oral sanitation and prophylaxis, which, if maintained until mature years, will render the teeth almost, if not quite, immune from decay, and make dental operations seldom, if ever, necessary. 2d. That the progressive spirit in which this most excellent educational scheme is planned demands the services of a dentist. 3d. That a copy of these resolutions be forwarded to the President of the Nautical Preparatory School, Providence, R. I."

The resolution was adopted.

Dr. A. R. Melendy:—There seems to be some confusion in regard to the means by which members of the National Dental Association may become members of the Southern Branch. According to the constitution, members of the National Dental Association in good standing, resident within the states set apart as belonging to the Southern Branch, may become members of the Southern Branch by paying their dues and satisfying the Treasurer that they are in good standing with the National.

The President asked for the report from the Committee on Microscopy, Pathology and Bacteriology.

The Secretary read a telegram from Dr. W. E. Walker of New Orleans, Chairman, expressing regret that he could not attend the meeting. Dr. B. Holly Smith read a letter from Dr. E. C. Kirk saying that he was quite ill and could not attend.

Dr. A. C. Hewitt read a paper, entitled "Cavity Lining, Importance and Value in Operative Dentistry."

Dr. M. F. Finley:—The committees of Congress are now dealing with the matter of dental legislation for the Navy, and I should like to have this body endorse the action of the Committee of the National Dental Association, which has introduced a bill in Congress to place dentists in the Navy with commissions. We have the support of all the colleges, and if you will permit it, Dr. Donnally has a resolution to present, and I would like to have it voted on now.

Dr. Wms. Donnally then read the following resolution:

Whereas, The Navy's need of an educated and efficient dental service is now practically universally recognized, and the Navy Department has three times recommended to Congress legislative provision therefor, and

Whereas, Mr. Roosevelt has said that "each individual unit of our Navy should be the best of its kind both in material and personnel that can be obtained in the world—that promotion must be fostered if the service is to be kept efficient;" and the Secretary of the Navy, in a letter to the Senate Naval Committee, under date of January 29, 1902, after referring to the contract system of the employment of officers temporarily adopted by the Army, said: "But the contract system of employing officers is foreign to the naval practice, and its adoption in the case of dental surgeons is not deemed advisable;" and

Whereas, The civil status of the dental profession and the interests and educational standards of our universities and colleges must suffer both at home and abroad by a legislative act which fails to accord to dental surgeons some measure of the grades of the commissioned rank which is accorded pay and medical officers; therefore,

Be It Resolved, That it is the sense of the members of this, the Southern Branch of the National Dental Association, and the profession universally, that the bills offered by Senators Pettus and Penrose and Representative Brownlow provide the lowest grades of rank that can possibly attract to the service such an educated and efficient dental corps as the personnel of the Navy deserves and the economic interests of the government demand.

Dr. Donnally said it was proposed to send this resolution to the Secretary of the Navy, the Chairmen of the Committees on Naval Affairs of the House and Senate, and also to Senator Gallinger, who has recently introduced a bill providing for contract men in the Navy. The Navy Department had committed itself against the contract system.

On motion of Dr. J. Y. Crawford, the resolution was unanimously adopted.

On motion, the meeting adjourned.

SECOND DAY—EVENING SESSION.

The evening session was called to order at 8 p. m.

Dr. Joseph Head read a paper, entitled "Punctured and Split Roots and Their Treatment."

After the discussion of Dr. Hewitt's and Dr. Head's papers, Dr. D. D. Smith read a paper, entitled "The Two Sources of Tooth Life and Their Relative Importance."

After discussion of this paper the meeting adjourned.

THIRD DAY—AFTERNOON SESSION.

The meeting was called to order at 2:30 p. m.

Dr. Chas. McManus then read a paper, entitled "The Educational Value of Dental History."

Dr. J. Y. Crawford moved that the paper be given exact and elaborate publication. Adopted.

On motion of Dr. Melendy, the President appointed a committee on resolutions. The committee was composed of Drs. J. Y. Crawford, J. E. Chace and C. L. Alexander.

Dr. C. L. Alexander read the following report:

REPORT OF COMMITTEE ON RESOLUTIONS.

Your Committee on Resolutions respectfully ask that the Association unanimously express its thanks and gratitude to the President and Board of Trustees of Columbian University for the splendid facilities which have been afforded for holding the meetings and clinics of this Association. And we ask you to further express our high appreciation of the splendid and hospitable manner in which the members of the District of Columbia and Maryland Dental Societies have entertained us during our stay in this the capital city of the United States. We extend usual thanks in most cordial manner to our President and all officers of the Association for the faithful manner in which they have discharged their duties. We are sorry to ask you to present our regrets to our Secretary that he was unable to be with us at this time. Fully appreciating his services in the past, we do most earnestly hope that he will be present at our next meeting. Please express thanks for the proffered rooms in which to hold our last session to-morrow morning. Also to the railroads centering in Washington for the usual reductions in rates. Also our appreciation to the press of Washington for its attention during our sessions. In order to show our appreciation of the attendance of so many visitors and their labors in making the meeting a success, we extend them a cordial invitation to come again.

On motion, the report was received and the committee discharged.

Dr. E. M. Kettig then read a paper on "Common Mistakes in Articulating Full Dentures."

Dr. D. R. Stubblefield sent in his paper, entitled "Something or Other About Chemistry," and in his absence it was read by the Secretary.

The Secretary read a paper entitled "The Preparation, Filling and Treatment of the Roots of Teeth," by Dr. L. G. Noel, the writer being absent.

Dr. Crawford read the report of the Committee on the President's address, as follows:

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS.

Your Committee begs, in addition to calling attention to some salient points and suggestions in the address of President Vann, which we think should be given due consideration, to thank him most sincerely on behalf of the Southern Branch for so masterful a presentation of his subject, "The Parallelism of Social and Professional Evolution from the Individual's Standpoint."

We would call attention first to the emphasis of our President, and recommend earnest support of him in the suggestions he makes, first, of unification of our state dental laws; second, of dental examination for life in-

surance; third, for the higher training of the dentist professionally and socially; fourth, to support him strongly in the suggestion for a better understanding and a more vigorous prosecution and presentation to our clientele and to the profession of the advantages accruing from the practice of oral prophylaxis; fifth, we endorse and ask the endorsemnet of the Society of his suggestions for a change in the constitution and by-laws, to conform to those of the National body, and for the adding of a program committee to the standing ones.

W. CRENSHAW,
J. Y. CRAWFORD,
B. HOLLY SMITH.

The report was received and the committee discharged.

On motion, the meeting adjourned.

FOURTH DAY—MORNING SESSION.

On motion of Dr. Crawford, the report on Appliances and Improvements, by Dr. J. J. Sarazzin, Chairman of the Committee, was ordered read by title and published in the proceedings.

The wisdom of publishing papers and reports that have not been read before the Association, and the duties of the Publication Committee, were here the subject of a lengthy discussion by Drs. Gray, Turner, Crouse, Finley, Mason and Spurgeon, and ended in the unanimous adoption of the following motion by Dr. Finley: "I move then, Mr. President, that the Publication Committee be given the power to eliminate from these reports handed in and not read any matter that would be improper for the Association to have published in their transactions regarding any new appliances."

The acting Secretary read the following report by Dr. Meadors on Appliances:

REPORT ON APPLIANCES.

Nashville, Tenn., Feb. 19, 1904.

Mr. Chairman & Gentlemen of So. Branch National Dental Association:—

Having been notified of my appointment upon this committee to state the advantages of new instruments in my practical use of same, gives me the liberty of calling your attention to some instruments and improvements which are not *new*, but should they have

been new, strictly speaking, I could not well have endorsed them. After this apology I first desire to call your attention to——

Instrument No. 1

Root Pliers. Invented by Dr. W. C. Gillespie, of Nashville, Tenn. Made by S. S. White Dental Mfg. Co. Diagram and description can be found on page 11 Advertising section of Dental Cosmos, for January, 1904. I send you this instrument for examination. It is practical and rapid when used.

"The handles are similar to those of the usual contouring pliers. One jaw is short and formed into a socket, which is threaded, to carry a small scraper with a head like the Case enamel cleavers. This scraper is adjustable endwise according to the length of the 'bite' to be taken, and is fixed when adjusted with a thumbscrew.

The other jaw is longer and curved outwardly, as shown by the dotted lines in the illustrations. Enveloping this arm and connected to it by a pin is a sliding 'fulcrum piece,' which works with a cam movement. The free end of the fulcrum piece is pointed, constituting a fulcrum for the operation of the appliance. The operation is simple. The fulcrum point is seated in the root-canal, with the head of the scraper at the proper point on the periphery. Then with a gentle force and sufficient pressure to hold the fulcrum point in place, the handles are closed. This causes the scraper to bite in the root, and the sliding of the fulcrum piece upon the curved arm draws it down to the end, scraping off a section of the root substance. By slightly rotating the pliers another and another bite is taken, until the entire periphery is reduced as desired. The work may be facilitated in many cases by giving the pliers a slight rocking movement when closing them."

Advantages of root-reducing pliers:

1. Gives a definitely coned root end. Cone surface follows festoon of gum attachments.

2. Attachment is not broken up at any point, as is the case with revolving root-reducers.

3. The pushing and pulling forces counter-balance each other in such a way there is no shock to patient when enamel is cleared away.

4. There can be no slipping of cleaver point resulting in laceration of gum and pain to patient.

5. Time saved in preparing root.

6. Lessened liability of gum recession after crown has been set because no injury has been inflicted upon soft tissues during operation.

Instrument No. 2.

A clever little device which I have just received, devised by Dr. D. M. Hitch and sold by L. D. Caulk & Co., is a nerve Broach Holder. Very simple in construction and upon examination all dentists will most likely see a convenience in its use. It consists of an oblong perforated nugget corrugated on its external surface for convenience of handling, perforation being with long axis of nugget the size of an ordinary broach which you pass through its length and is set by a little set screw in the side of holder. Two holders and a small screw driver make up the appliance.

Send appliance for examination.

Instrument No. 3.

Cervical Clamp—Invented by Dr. D. T. Dupree of Brownsville, Tenn. Will be on the market in a few weeks. To be handled by L. D. Caulk of Philadelphia. Although not having used this instrument, judging from diagram the value it will be to the dentists, I submit these notes that its merits might be understood. Find under separate cover the inventor's model. The inventor's diagram and explanation of same, find herein.

"This model is not quite perfect but will do to illustrate the idea intended. The claw is too wide and is hard to adjust on a small tooth. In the instrument for the market it will be sufficiently small to adjust on any tooth. The screw on the under side is for tightening clamp on the tooth. Another threaded hole is to be made near the end so it will serve its purpose on short teeth.

The advantages this clamp has are:

1. The ease of adjustment and its power of retaining its hold to the tooth when it has been adjusted.

2. The great force you can get to drive the gum away by turning the screw, to which the claw is fastened.

* * * * * * * * * * *

Under the head of instruments and improvements, I feel it will be my privilege to call attention to an antiseptic material for root filling, which although having been brought before local Kentucky

Societies once or twice, perhaps the So. Branch as a body have not yet considered it.

Dr. John C. Blair's Foram-Purcha—
Ingredients:
- Formaldehyde Gas
- Aqueous Sol 40 per cent
- Oil of Eucalyptus
- Oil of Cassia
- Red base plate
- Gutta-Percha.

Although having used this material for about two years, I could not claim it as something new, to the profession, but having been instructed by my chairman to render my notes based upon experience, and trusting that some of our members might appreciate my notes on this matter, I have to state that this material, as result of Dr. Blair's experiments was first formulated and used by him, as a permanent root canal filling about three years ago. My attention having been called to it, I purchased, I suppose, one of the first bottles which was placed before the profession. Although having used previous to this time, chlora purcha and gutta percha points for root canal fillings; in a short while I discarded chlora percha and in its stead used forma percha and gutta percha points.

Its physical appearance is like unto a thick cream of pinkish hue. It, at ordinary temperature, appears a little too thick for working into root canals. By slightly warming, (it becoming sufficiently fluid at the body temperature) you can easily pump it into the smallest pulp canals.

Its Merits:

Due to its semi-solid condition, the ease with which you can take up a globule and apply to your pulp chamber, next, its melting at body temperature and ease of pumping with fine broach into canals —its antiseptic properties due to formaldehyde, or either of the two oils. Although suggested by the inventor the use of cotton saturated with this as a permanent root filling material, preferable to other materials—I guess due to an innate fear of cotton as a permanent filling material, I have invariably used the gutta percha point with this material in preference to the other agents (the filling then being in it entirely non absorbent) good results always following except in some cases where I fear I pumped some of the fluid into the tissue beyond the apical foramen—however, no serious conditions arise. When I am confident of having given the canals

proper treatment—the trouble I believe is due to the irritating effect of the formaldehyde. This material is suggested for pulp capping, cavity lining, sensitive dentine, etc., for which you can find by experiment according to suggestions of the inventor, to be an acceptable agent.

* * * * * * * * * * *

I ask the privilege of referring to a material for pulp capping, composed of thymol and oxide of zinc, prepared by L. D. Caulk and known as Caulk Pulp Preserver and Nerve Capper. It is composed of two materials, a crystal and a flake, which makes it very convenient for application. After all preparations of cavity are finished, warm a pair of pliers, place them in the crystal body. The crystal becomes fluid and by capillary attraction a portion of the fluid is retained between the points of the pliers. The points are then inserted into the cavity, and the floor is bathed with this fluid. You then place a flake into the cavity and touch it with a warm burnisher and the entire mass becomes united and crystallized in a few seconds. Surplus can be chipped away and the filling desired may be inserted.

I have used this material only a few months but find it so far to be quite an ideal pulp capper. Canals can be filled successfully with it. It is also very serviceable in strengthening weak enamel walls. I refer you to Dental Brief, January number, 1904, for full detail of the method of applying this material and its merits as a pulp preserver.

A fountain spittoon which has for a short while been on the market and which I have used sufficiently long to appreciate its value, is the "Blair," made by the Blair Wedekind Co., of Louisville, Ky. Simple, neat, serviceable, always clean, no objections to it that I know. Respectfully submitted by

Jos. T. Meadors, Nashville, Tenn.
Member of Committee on Instruments and Improvements.

Dr. J. Hall Moore arose during the reading of the paper and objected to the names of the manufacturers and salesmen being read in connection with new appliances. A lengthy discussion by Drs. Moore, Dotterer, Crossland, Gray, Jones, Tucker and Betts followed, but it was finally agreed that the paper would have to pass through the hands of the Publication Committee and that it could

then be edited, and the acting Secretary finished reading it. On motion of Dr. Crawford, the paper was received and referred to the Publication Committee.

Dr. B. Holly Smith stated that he had made his report, but that he wished to say that Dr. Primrose of Baltimore, who had promised a paper, had lost all his models by fire and was unable to present the subject. He stated that Dr. Crossland had a paper on "Education, Duty, Faith and Destiny." Before reading the paper Dr. Crossland requested that he be allowed to withdraw it and present it to a journal for publication. After considerable discussion it was decided that the matter of granting this request was within the province of the Publication Committee, which committee later granted the request. The paper was received for discussion.

On motion of Dr. B. H. Smith, the Secretary was instructed to write Dr. Primrose a note of sympathy.

Dr. J. Y. Crawford, for the Committee on Resolutions, reported the following:

Inasmuch as Senate Bill 4032 provides a less favorable status for Navy dental surgeons than the unsatisfactory expedient temporarily adopted by the Army,

Be It Resolved, That it is the sense of the Southern Branch of the National Dental Association that it is the duty of every loyal member of the dental profession to use his utmost endeavor to prevent the passage of this bill, to the end of finally assuring to both Navy and Army personnel a competent and efficient dental service with a status that will not be a blot on the profession at home and abroad.

On motion of Dr. Donnally, a rising vote was asked for and the resolution was adopted unanimously.

Dr. Adair asked that a committee on grievances be appointed to confer with him, and the President appointed Drs. Wm. Crenshaw and T. M. Milam to act with the ex-officio members of said committee.

Dr. H. F. R. Snyder then read a paper, entitled "The Four-year Course—Is It Necessary?" The paper was received and discussed.

On motion of Dr. Chace, the subject was passed.

On motion, the election of officers was held, resulting as follows: President, Dr. C. L. Alexander, Charlotte, N. C.; 1st Vice-president, Dr. W. G. Mason, Tampa, Fla.; 2d Vice-president, Dr. L. P. Dotterer, Charleston, S. C.; 3d Vice-president, Dr. N. N. Vann, Attalla,

Ala.; Corresponding Secretary, Dr. J. H. London, Washington; Treasurer, Dr. B. D. Brabson, Knoxville, Tenn.; Recording Secretary, Dr. J. H. Crossland, Montgomery, Ala.; Executive Committee, Dr. A. R. Melendy, Chairman, Knoxville, Tenn.; Dr. B. Holly Smith, Baltimore; Dr. V. E. Turner, Raleigh, N. C.; Dr. J. E. Chace, Tampa, Fla.; Dr. J. P. Gray, Nashville; Publication Committee, Dr. J. H. Crossland, Chairman ex officio, Ala.; Dr. S. W. Foster, Ga.; Dr. J. A. Gorman, N. C., and Dr. G. E. Hardy, Md.

The report of the Executive Committee was then read as follows:

REPORT OF EXECUTIVE COMMITTEE.

Your Committee beg to report: 1. That they have received into membership of this Association Drs. W. S. Frankland, H. L. King and L. S. Wolfe from the D. C. Dental Society of Washington, D. C. 2. That they have audited the accounts of the Treasurer, Dr. B. D. Brabson, and find the same correct and showing a balance in the treasury of $416.07. 3. That in view of some misunderstanding as regards the appropriation made at the Asheville meeting in July, 1903, to the N. D. A., the following statement is made: The Southern Branch of the N. D. A. voted to increase the amount actually due the N. D. A. at that meeting, from $284 to $500, donating $150 of this sum through the N. D. A. to the use of the Fourth International Dental Congress, the balance to be used toward defraying expenses of the meeting at Asheville. 4. Your Committee also call your attention to the fact that the terms of two members of the Executive Committee expire this year—Drs. Fife and Melendy.

Your Executive Committee, having carefully considered the financial status of the Association, and knowing the special need of the International Dental Congress for funds at this time, together with your interest in this great work, recommend that an additional appropriation of $100 be made for use of the Fourth International Dental Congress.

(Amended to $150 and passed.)

A. R. MELENDY, Chairman Executive Committee.

The report of the Committee on Clinics was read, as follows:

REPORT OF COMMITTEE ON CLINICS.

The following gentlemen gave clinics—Dr. W. V-B. Ames of Chicago, "Adhesion of Cement to Porcelain and Dentin." He demonstrated the possibility of creating upon the reverse surface of a porcelain inlay a film or trace of mixture of fusible silicate and zinc oxid which will give retention similar to an etched surface, but chemical continuity of this film with the cement with which the inlay is set; also that such a film is efficacious upon the surface of a porcelain facing forced from a crown or bridge.

Dr. C. L. Alexander of Charlotte, N. C., gave a method of making contour gold inlays of perfect adaptation to margins by the use of Moss Fibre Gold.

Dr. G. V. I. Brown of Milwaukee, Wis., operated upon a case of abscess of the antrum of Highmore. Dr. W. B. Finney of Baltimore exhibited a case of the method of gaining stability of an upper full denture in flat mouths. Dr. C. M. Gingrich of Baltimore exhibited a number of non-cohesive gold fillings on proximate spaces. Dr. C. J. Grieves of Baltimore showed successive steps of constructing a saddle bridge without making dies and counterdies, a method of contouring and backing the porcelain, and several features of economy in this class of work. Dr. H. E. Kelsey of Baltimore showed dentures employing the Jackson crib for retention. Dr. J. S. Betts of Greensboro, N. C., placed a contour gold filling on the distal surface of an upper second bicuspid and occupying one-half of occlusal surface. He used non-cohesive gold to protect cervical, buccal and lingual portions of cavity, and brought filling to full contour with cohesive pellets. Dr. Wm. Crenshaw of Atlanta showed the adjustment and use of a new matrix for the anterior teeth. Dr. R. Ottolengui of New York gave a table clinic, at which he exhibited numerous models of cleft palate cases, with the instruments, including both hard and soft rubber appliances. Dr. D. O. M. Le Cron of St. Louis demonstrated a method of replacing porcelain facings when broken from crowns or bridges; also continuous gum work from models. Dr. J. T. Meadors, Nashville, sent for exhibition a broach holder, a cervical clamp and a pair of mechanical forceps.

The Committee is indebted to the Columbian University, the S. S. White Mfg. Co., the Electro-Dental Mfg. Co., Mr. Ivory and other exhibitors, who courteously loaned aid in supplying the wants of the clinicians.

Dr. T. P. Hinman of Atlanta, Chairman of this Committee, was unable to attend the meeting, and Dr. S. W. Bowles of Washington acted as Chairman.

Expenses incurred were $1.40.

Dr. J. A. Gorman of Asheville, N. C., was appointed to the Committee.

Respectfully submitted, S. W. Bowles.

Dr. Stewart J. Spence of Chattanooga read a paper entitled "Various Reforms in Prosthodontia."

Respectfully submitted,

J. H. Crossland, Secy.

Members of the Southern Branch of National Dental Association

who have paid dues for 1902, also names of charter members of the old Southern Dental Association, who are exempt from dues but are to receive the transactions, and will be marked thus *.

ADAIR, R. B. ..... Atlanta, Ga.
ADAIR, ROBIN ..... Atlanta, Ga.
ALLEN, H. JEROME ..... Washington, D. C.
ALEXANDER, C. L. ..... Charlotte, N. C.
ALEXANDER, I. H. ..... Camden, S. C.
ALFORD, W. B. ..... Sumter, S. C.
ALLEN, T. M. ..... Birmingham, Ala.
ANTHONY, L. P. ..... Atlanta, Ga.
*ARRINGTON, B. F. ..... Goldsboro, N. C.
AUGSPATH, LOUIS. ..... Little Rock, Ark.
BARNWELL, C. M. ..... Atlanta, Ga.
BEACH, H. E. ..... Clarksville, Tenn.
BEACH, JOHN R. ..... Clarksville, Tenn.
BEADLES, E. P. ..... Danville, Va.
BENTON, J. H. ..... Newberne, N. C.
BETTS, J. S. ..... Greensboro, N. C.
BILLMEYER, U. D. ..... Chattanooga, Tenn.
BLAND, CHARLES A. ..... Charlotte, N. C.
BOGLE, R. BOYD. ..... Nashville, Tenn.
*BOYD, H. D. ..... Troy, Ala.
BOOZER, J. W. ..... Columbia, S. C.
BOOZER, J. E. ..... Columbia, S. C.
BOOZER, D. L. ..... Newberry S. C.
BRABSON, B. D. ..... Knoxville, Tenn.
BRINGHURST, T. P. ..... Shawnee, Okla. Ter.
BROCKETT, C. T. ..... Atlanta, Ga.
BROWN, J. P. H. ..... Augusta, Ga.
BUCK, F. E. ..... Jacksonville, Fla.
BURNETTE, J. H. ..... Graniteville, S. C.
BOWLES, S. W. ..... Washington, D. C.
CALVERT, J. T. ..... Spartanburg, S. C.
CARLISLE, J. P. ..... Greenville, S. C.

CARR, S. F. ..... Clarksdale, Miss.
CARROLL, R. W. ..... Beaumont, Texas.
*CARPENTER, L. D. ..... Atlanta, Ga.
CASSIDY, J. S. ..... Covington, Ky.
CHACE, J. E. ..... Orlando, Fla.
CHAMBERS, E. A. ..... Hickory, N. C.
CHAPPLE, J. A. ..... Atlanta, Ga.
CLIFTON, W. R. ..... Waco, Texas.
*COLE, W. T. ..... Newman, Ga.
COLSON, C. B. ..... Charleston, S. C.
COMBS, J. W. ..... New Braunfels, Texas.
*COOK, W. H. ..... Denton, Texas.
COOK, S. B. ..... Chattanooga, Tenn.
CORLEY, J. P. ..... Greensboro, Ala.
COWARDIN, L. M. ..... Richmond, Va.
CRAWFORD, J. Y. ..... Nashville, Tenn.
CRENSHAW, WM. ..... Atlanta, Ga.
CRENSHAW, THOMAS ..... Atlanta, Ga.
CROSSLAND, J. H. ..... Montgomery, Ala.
CRUTCHER, R. D. ..... Lewisburg, Tenn.
DALE, J. A. ..... Nashville, Tenn.
DASHWOOD, P. T. ..... Atlanta, Ga.
DAVID, J. W. ..... Corsicana, Texas.
DICK, G. W. ..... Sumter, S. C.
DICKSON, SOUTHALL ..... Bolivar, Tenn.
DONNALLY, WMS. ..... Washington, D. C.
DOTTERER, L. P. ..... Charleston, S. C.
DUFF, SAM G. ..... Greenville, Texas.
EBLE, M. M. ..... Louisville, Ky.
ELKINS, L. C. ..... St. Augustine, Fla.
EUBANK, GEO. ..... Birmingham, Ala.
EVANS, PAUL W. ..... Washington, D. C.
EVERITT, D. E. ..... Raleigh, N. C.
EWALD, W. H. ..... Portsmouth, Va.
FAUCETTE, J. W. ..... Asheville, N. C.
FEAGAN, J. H. ..... Spartanburg, S. C.
FIFE, J. G. ..... Dallas, Texas.
FINLEY, M. F. ..... Washington, D. C.
FINNEY, W. B. ..... Baltimore, Md.
FLEMING, J. M. ..... Raleigh, N. C.
FLEMING, A. H. ..... Lewisburg, N. C.
FOSTER, S. W. ..... Atlanta, Ga.
FRINK, C. H. ..... Fernandina, Fla.
FRANKLAND, W. S. ..... Washington, D. C.
FRAZIER, J. E. ..... Birmingham, Ala.
FRIEDRICHS, A. G. ..... New Orleans, La.
FROST, EDWARD D. ..... Elizabeth, N. J.

FULLER, R. D. ..... Ocala, Fla.
GASQUE, E. A. ..... Marion, S. C.
*GORGAS, F. J. S. ..... Baltimore, Md.
GORMAN, J. A. ..... Asheville, N. C.
GRANT, W. E. ..... Louisville, Ky.
GRAY, J. P. ..... Nashville, Tenn.
GRIEVES, C. J. ..... Baltimore, Md.
GUNN, C. L. ..... Gadsden, Ala.
HAIR, GEO. F. ..... Bamberg, S. C.
HALL, J. A. ..... Collinsville, Ala.
HALL, D. M. ..... Eutaw, Ala.
HALL, B. F. ..... Asheville, N. C.
HAMILTON, T. W. ..... Marion, S. C.
HARDY, GEO. E. ..... Baltimore, Md.
HARRIS, JAS. H. ..... Baltimore, Md.
HASSELL, H. CLAY ..... Tuscaloosa, Ala.
HINMAN, T. P. ..... Atlanta, Ga.
HOAGLAND, W. M. ..... Atlanta, Ga.
HOLLAND, FRANK ..... Atlanta, Ga.
HORTON, P. E. ..... Winston, N. C.
HOWELL, I. B. ..... Paducah, Ky.
HUNT, F. L. ..... Asheville, N. C.
HUNTER, T. M. ..... Fayetteville, N. C.
HUNTER, E. L. ..... Fayetteville, N. C.
JACKSON, A. M. ..... Macon, Ga.
JETER, I. P. ..... Morganton, N. C.
JEWETT, H. R. ..... Atlanta, Ga.
JOHNSON, H. H. ..... Macon, Ga.
JOHNSON, S. W. ..... Brownwood, Texas.
JONES, R. H. ..... Winston, N. C.
JONES, HENRY C. ..... Richmond, Va.
JOYNER, P. M ..... Union City, Tenn.
KEERANS, E. P. ..... Charlotte, N. C.
KERLEY, W. A. ..... Glasgow, Ky.
KETTIG, E. M. ..... Louisville, Ky.
KING, H. L. ..... Washington, D. C.
KING, W. C. ..... Nashville, Tenn.
*KNAPP, J. S. ..... New Orleans, La.
KNAPP, J. ROLLO ..... New Orleans, La.
KNOEBLOCK, L. E. ..... Charleston, S. C.
LAW, E. A. ..... Bartow, Fla.
LEONARD, N. C. ..... Nashville, Tenn.
LESEUER, W. N. ..... Austin, Texas.
LITTLE, J. B. ..... Newton, N. C.
LONDON, J. H. ..... Washington, D. C.
*LOWRANCE, H. A. ..... Athens, Ga.
LUCKIE, R. K. ..... Holly Springs, Miss.
MARKWELL, RUSSELL ..... Galveston, Texas.

*Marshall, E. B. ..... Rome, Ga.
Marshall, M. C. ..... St. Louis, Mo.
Martin, W. T. ..... Yazoo City, Miss.
Mason, W. G. ..... Tampa, Fla.
Meadors, J. T. ..... Columbia, Tenn.
Melendy, A. R. ..... Knoxville, Tenn.
Merchant, M. S. ..... Giddings, Texas.
Merrill, Charles A. ..... Birmingham, Ala.
Meriwether, T. M. ..... Westminster, S. C.
Milam, T. M. ..... Little Rock, Ark.
Monroe, W. D. ..... Washington, D. C.
Moore, J. Hall ..... Richmond, Va.
Moore, T. T. ..... Columbia, S. C.
Moore, T. T., Jr. ..... Columbia, S. C.
Morgan, H. W. ..... Nashville, Tenn.
McAnnally, F. H. ..... Jasper, Ala.
McDonald, J. P. ..... Shelbyville, Tenn.
*McDonald, R. H. ..... Griffin, Ga.
McTyiere, R. P. ..... Bessemer, Ala.
Naibors, S. F. ..... Birmingham, Ala.
Neill, J. S. ..... New Decatur, Ala.
Noel, L. G. ..... Nashville, Tenn.
Orrison, J. E. ..... Baltimore, Md.
Page, A. S. ..... Columbia, Tenn.
Passmore, E. N. ..... Abbeville, Ala.
Pratt, H. J. ..... Atlanta, Ga.
Pressey, J. B. ..... Portsmouth, Va.
Proctor, W. E. ..... Sheffield, Ala.
Quattlebaum, E. G. ..... Columbia, S. C.
*Rambo, S. D. ..... Marietta, Ga.
Ramsey, W. B. ..... Hickory, N. C.
Renalds, W. R. ..... Salem, Va.
Rich, Celia ..... Nashville, Tenn.
Rich, S. L. ..... Nashville, Tenn.
Richards, W. H. ..... Knoxville, Tenn.
Richardson, Charles ..... Fayetteville, Ark.
Reid, J. G. ..... Marion, N. C.
Rutledge, B. ..... Florence, S. C.
Sarrazin, Jules J. ..... New Orleans, La.
Sharp, S. P. ..... Knoxville, Tenn.
Simms, W. P. ..... Nashville, Tenn.
Simons, Ben ..... Charleston, S. C.
Simpson, I. ..... Rock Hill, S. C.
Slack, W. M. ..... Memphis, Tenn.
Slater, W. K. ..... Knoxville, Tenn.
Smith, B. Holly ..... Baltimore, Md.
Smith, L. A. ..... Port Gibson, Miss.

SMITH, J. P. ..... Martinsville, Va.
SPENCE, S. J. ..... Chattanooga, Tenn.
STEWART, H. T. ..... Memphis, Tenn.
STEWART, ELBERT ..... Little Rock, Ark.
STIFF, F. W. ..... Richmond, Va.
SPURGEON, J. S. ..... Hillsboro, N. C.
TALBOT, W. O. ..... Biloxi, Miss.
TEAGUE, B. H. ..... Aiken, S. C.
THOMPSON, R. W. ..... Spartanburg, S. C.
THORPE, B. L. ..... St. Louis, Mo.
*TIGNER, J. A. ..... Rome, Ga.
TUCKER, E. J. ..... Roxboro, N. C.
TUNSTALL, P. R. JR. ..... Mobile, Ala.
TURNER, V. E. ..... Raleigh, N. C.
TURNER, M. E. ..... Atlanta, Ga.
VANN, GEO. S. ..... Gadsden, Ala.
VANN, N. N. ..... Attalla, Ala.
VIGNES, C. V. ..... New Orleans, La.
WALKER, W. E. ..... New Orleans, La.
WALKER, J. L. ..... Norfolk, Va.
WALKER, R. H. ..... Norfolk, Va.
WARE, R. E. ..... Shelby, N. C.
WATKINS, W. E. ..... Winston, N. C.
WEAVER, W. H. ..... LaGrange, Ga.
WELLS, W. D. ..... Macon, Ga.
WESTERFIELD, T. L. ..... Dallas, Texas.
WESTMORELAND, W. W. ..... Columbia, Miss.
WHITBY, T. P. ..... Selma, Ala.
WHITMAN, C. B. ..... Orlando, Fla.
WHITMAN, F. L. ..... Auburn, Ala.
WIBER, D. E. ..... Washington, D. C.
WILSON, F. C. ..... Savannah, Ga.
WISE, J. D. ..... West Point, Miss.
WOLFE, L. S. ..... Washington, D. C.
WOMACH, C. T. ..... Martinsville, Va.
WOOD, F. L. ..... Roanoke, Va.
WRIGHT, W. R. ..... Jackson, Miss.
WRIGHT, E. P. ..... Richmond, Va.
WRIGHT, I. C. ..... Tupelo, Miss.
WYATT, T. M. ..... Bentonville, Ark.
YATES, D. M. ..... Rock Mills, Ala.
ZERKLE, WM. ..... Atlanta, Ga.

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